clecked by 17 10/13/15

MEMORANDUM

TO:

Mr. Addison Rice

Anderson, Mulholland and Associates

DATE: September 30, 2015

FROM: R. Infante

FILE: JC3254

RE:

Data Validation

BMSMC, Former Tank Farm, PR

SM02.00.02

Accutest Job Number: JC3254

SUMMARY

Full validation was performed on the data for several groundwater samples analyzed selected volatile organic compound by method SW846-8260C, selected alcohols by method SW846-8015C (DAI) and selected semivolatiles organics (PAHs) by method 8170D (SIM). The samples were collected at the BMSMC, Building 5 Area, Humacao, PR site on June 3-5, 2015 and submitted to Accutest Laboratories of Dayton, New Jersey that analyzed and reported the results under delivery group (SDG) JC3254.

The sample results were assessed according to USEPA data validation guidance documents in the following order of precedence: "USEPA Region 2, SOP HW-24, Validating Volatile Organic Compounds by GC/MS, SW-846 Method 8260B (August 2009-Revision 2), the USEPA National Functional Guidelines for Low Concentration Organic Data Review (August 2009-Revision 2), the USEPA National Functional Guidelines for Organic Data Review for Low Concentration Water (SOP HW-13, August 2009-Revision 3); Data Validation Standard Operating Procedure for Organic Analysis of Low/Medium Concentration Semivolatile Acquired using SW-846 Method 8270C (SOW SOM01.2-SOP HW-35, August 2009 -Revision 1); Validating Semivolatile Organic Compounds by GC/MS, SW846 8270D (SOP HW-22, August, 2009 - Revision 4) (noted herein as the "primary guidance documents"). Also, QC criteria from "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods SW-846 (Final Update IV, December 1998)," are utilized. The guidelines were modified to accommodate the non-CLP methodology. The QC criteria and data validation actions listed on the data review worksheets are from the primary guidance document, unless otherwise noted.

In general the data are valid as reported and may be used for decision making purposes. Results for Anthracene were qualified as estimated (J) in samples JC3254-17 and JC3254-18 due to MS/MSD recovery outside control limits; results for sample JC3254-30 qualified as estimates due to extraction of the sample one day after holding time limit.

SAMPLES

FIELD SAMPLE ID	LABORATORY ID	ANALYSIS
MW-15	JC3254-1	VOCs
MW-17	JC3254-2	VOCs
MW-5	JC3254-3	VOCs
MW-14	JC3254-4	VOCs
QC TB 030915	JC3254-5	VOCs
S-35	JC3254-6	VOCs, Alcohols
S-35D	JC3254-7	VOCs, Alcohols



FIELD SAMPLE ID	LABORATORY ID	ANALYSIS
S-36	JC3254-8	VOCs, Alcohols
S-32	JC3254-9	VOCs, Alcohols
S-33	JC3254-10	VOCs, Alcohols
MW-18	JC3254-11	VOCs
MW-3	JC3254-12	VOCs
MW-13	JC3254-13	VOCs
MW-13D	JC3254-14	VOCs
MW-7	JC3254-15	VOCs
MW-16	JC3254-16	VOCs
MW-16D	JC3254-16 MSD	VOCs
MW-16S	JC3254-16 MS	VOCs
MW-12	JC3254-17	VOCs, SVOCs
MW-12D	JC3254-18	VOCs, SVOCs
QC TB 090915	JC3254-19	VOCs
A-IR(5)	JC3254-20	VOCs, Alcohols
A-2R(2)	JC3254-21	VOCs, Alcohols
VP-1 UP-2T	JC3254-22	VOCs, Alcohols
VP-2 UP-21	JC3254-23	VOCs, Alcohols
D-1R	JC3254-24	VOCs, Alcohols
S-31R(2)	JC3254-25	VOCs, Alcohols
S-31R(2)D	JC3254-25 MSD	VOCs, Alcohols
S-31R(2)S	JC3254-25 MS	VOCs, Alcohols
S-29R	JC3254-26	VOCs, Alcohols
E-1R	JC3254-27	VOCs, Alcohols
G-1R(3)	JC3254-28	VOCs, Alcohols
S-34	JC3254-29	VOCs, Alcohols
EB090915	JC3254-30	VOCs, Alcohols, SVOCs
TB090915	JC3254-31	VOCs

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable to the method

- Agreement of analysis conducted with chain of custody (COC) form
 Holding time and sample preservation
 Gas chromatography/mass spectrometry (GC/MS) tunes

- Initial and continuing calibrationsMethod blanks/trip blanks/field blank

- Surrogate spike recovery
- Matrix spike/matrix spike duplicate (MS/MSD) results
- o Internal standard performance
- Field duplicate results
- o Laboratory control sample/laboratory control sample duplicate (LCS/LCSD) results
- o Quantitation limits and sample results

DISCUSSION

Agreement of Analysis Conducted with COC Request

Sample reports corresponded to the analytical request designated on the chain-of-custody form.

Holding Times and Sample Preservation

The cooler temperatures were within the QC acceptance criteria of $4^{\circ}C \pm 2^{\circ}C$.

Sample preservation was acceptable.

Samples analyzed within method recommended holding time except for the following:

 JC3254-30 - sample extracted one day after holding time limit. Results are qualified as estimated (J).

GC/MS Tunes

The frequency and abundance of bromofluorobenzene (BFB) tunes were within the QC acceptance criteria. All samples were analyzed within the tuning criteria associated with the method.

Initial and Continuing Calibrations

VOCs

The percent relative standard deviations (%RSDs) and response factors (RFs) of all target analytes were within the QC acceptance criteria in the initial calibration. Correlation coefficients (r²) of target analytes were within the QC acceptance criteria. Ongoing accuracy of the instrument was determined by the analysis of a continuing calibration standard.

SVOCs

The percent relative standard deviations (%RSDs) and response factors (RFs) of all target analytes were within the QC acceptance criteria in the initial calibration. Correlation coefficients (r²) of target analytes were within the QC acceptance criteria. Ongoing accuracy of the instrument was determined by the analysis of a continuing calibration standard.

<u>Alcohols</u>

The percent relative standard deviations (%RSDs) and response factors (RFs) of all target analytes were within the QC acceptance criteria in the initial calibration. Correlation coefficients (r²) of target analytes were within the QC acceptance criteria. Ongoing accuracy of the instrument was determined by the analysis of a continuing calibration standard.



Method Blank/Trip Blank/Field Blank

Target analytes were not detected in laboratory method blanks for VOCs, SVOCs, and alcohols.

No target analyte (VOCs) detected in the trip blanks. No target analyte (VOCs, SVOCs, and Alcohols) detected in the trip blanks. No field/trip analyzed with this data package for Alcohols and VOCs.

Surrogate Spike Recovery

The surrogate recoveries were within the laboratory QC acceptance limits in all samples analyzed except for the followings:

• Nitrobezene-d5 recovery outside control limits in samples JC3254-17 and JC3254-18 due to matrix interference. Confirmed by re-extraction. No action taken.

MS/MSD

VOCs

Matrix spike was performed on samples JC3254-25MS/-25MSD; JC3254-16MS/-16MSD; JC3254-20MS/-20MSD; JC3254-6MS; and JC3137-3MS/-3MSD. Recoveries for MS/MSD and RPD were within laboratory control limits except for the following:

- Ethylbenzene MS/MSD % recoveries in sample JC3254-25MS/-25MSD outside control limits. No action taken, high level of sample relative to spike amount.
- Benzene MS/MSD % recoveries in sample JC3795-7MS/-7MSD outside control limits. No action taken, high level of sample relative to spike amount.

SVOCs

Matrix spike was performed on samples JC3769-2MS/-2MSD and JC3875-2MS/-2MSD. Recoveries for MS/MSD and RPD were within laboratory control limits except for the followings:

- Anthracene MS/MSD recoveries in sample JC3769-2 outside control limits. Results qualified as estimated (J) in affected samples.
- Chrysene MSD recovery outside control limit in sample JC3769-2. No action taken, professional judgment.
- Fluoranthene and Phenanthrene MS/MSD recoveries in sample JC3769-2 outside control limits. No action taken, no action taken due to high level of sample relative to spike amount.

<u>Alcohols</u>

Matrix spike was performed on samples JC3254-25MS/-25MSD. Recoveries for MS/MSD and RPD were within laboratory control limits

Internal Standard Performance

VOCs

Samples were spiked with the method specified internal standard. Internal standard performance met the QC acceptance criteria in all sample analyses.

SVOCs

Samples were spiked with the method specified internal standard. Internal standard performance met the QC acceptance criteria in all sample analyses.

Field Duplicate Results

Field duplicates were analyzed as part of this data set for VOCs, SVOCs, and Alcohols. RPD results were within laboratory/recommended control limits.

LCS/LCSD Results

VOCs

The laboratory analyzed one LCS (blank spike) associated with each matrix from this data set. The % recoveries of all spiked analytes were within the laboratory QC acceptance limits.

SVOCs

The laboratory analyzed one LCS (blank spike) associated with each matrix from this data set. The % recoveries of all spiked analytes were within the laboratory QC acceptance limits.

Alcohols

The laboratory analyzed one LCS (blank spike) associated with each matrix from this data set. The % recoveries of all spiked analytes were within the laboratory QC acceptance limits.

Quantitation Limits and Sample Results

Dilutions were required for several VOCs samples with this data set due to analyte concentration outside the calibration range.

Calculations were spot checked.

Certification

The following samples JC3254-1; JC3254-2; JC3254-3; JC3254-4; JC3254-5; JC3254-6; JC3254-7; JC3254-8; JC3254-9; JC3254-10; JC3254-11; JC3254-12; JC3254-13; JC3254-14; JC3254-15; JC3254-16; JC3254-16D; JC3254-16S; JC3254-17; JC3254-18; JC3254-19; JC3254-20; JC3254-21; JC3254-22; JC3254-23; JC3254-24; JC3254-25; JC3254-25D; JC3254-25S; JC3254-26; JC3254-27; JC3254-28; JC3254-29; and JC3254-30 were analyzed following standard procedures accepted by regulatory agencies. The quality control requirements met the methods criteria except in the occasions described in this document. The results are valid.

Rafael Infante

Chemist License 1888

Report of Analysis

Page 1 of 1

VP-1 UP-1" Client Sample ID: Lab Sample ID: JC3254-22

Hexanol

Hexanol

Matrix: Method:

Project:

111-27-3

111-27-3

AQ - Ground Water

SW846-8015C (DAI)

BMSMC, Former Tank Farm, PR

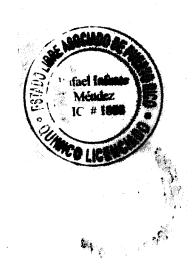
Date Sampled: 09/04/15 Date Received: 09/10/15

Percent Solids: n/a

Run #1 Run #2	File ID GH101448.D	DF 1	Analyzed 09/14/15	By XPL	Prep D n/a	etc .	Prep Batch n/a	Analytical Batch GGH5006
CAS No.	Compound		Result	RL	MDL	Units	Q	
67-63-0 67-56-1	Isopropyl Alcoh Methanol	ol	ND ND	100 200	25 45	ug/l ug/l		
CAS No.	Surrogate Reco	veries	Run# 1	Run#	2 Lim	its		

86%

90%



48-150%

48-150%

ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank

Report of Analysis

Page 1 of 1

Client Sample ID: VP-2 VP-2 Lab Sample ID: JC3254-23

Matrix: Method: AQ - Ground Water

SW846 8260C

BMSMC, Former Tank Farm, PR

Date Sampled: 09/04/15

Date Received: 09/10/15

Percent Solids: n/a

	File ID	DF	Analyzod	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2B134392.D	1	09/12/15	BK	n/a	n/a	V2B5988

Run #2

Project:

Purge Volume

Run #1 5.0 ml

Run #2

VOA Special List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	10	3.3	ug/l	
71-43-2	Benzene	ND	0.50	0.24	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.27	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	1.0	ug/l	
108-88-3	Toluene	ND	1.0	0.16	ug/l	
1330-20-7	Xylene (total)	ND	1.0	0.17	ug/l	
CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Lim	its	
1868-53-7	Dibromofluoromethane	107%		76-1	20%	•
17060-07-0	1,2-Dichloroethane-D4	115%		73-1	22%	
2037-26-5	Toluene-D8	106%		84-1	19%	
460-00-4	4-Bromofluorobenzene	105%		78-1	17%	



ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank



111-27-3

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Report of Analysis

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09/04/15

09/10/15

Client Sample ID: VP-2 UP-2 Lab Sample ID: JC3254-23 Matrix: AQ - Ground Water Method:

Hexanol

Date Received: SW846-8015C (DAI) Percent Solids: n/a

Project: BMSMC, Former Tank Farm, PR

1								
Run #1 Run #2	File ID GH101449.D	DF 1	Analyzed 09/14/15	By XPL	Prep D n/a	ate	Prep Batch n/a	Analytical Batch GGH5006
CAS No.	Compound		Result	RL	MDL	Units	Q	
67-63-0	Isopropyi Alco	hol	ND	100	25	ug/l		
67-56-1	Methanol		ND	200	45	ug/l		
CAS No.	Surrogate Rec	xoveries	Run#1	Run# 2	Lim	its		
111-27-3	Hexanol		89%		48-1	50%		

93%



48-150%

Date Sampled:



MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank

N = Indicates presumptive evidence of a compound

Report of Analysis

Page 1 of 1

Client Sample ID: D-1R

Lab Sample ID:

JC3254-24

Matrix: Method: AQ - Ground Water

Project:

SW846 8260C

BMSMC, Former Tank Farm, PR

Date Sampled:

09/07/15

Date Received: 09/10/15

Percent Solids: n/a

File ID DF Analyzed By **Analytical Batch** Prop Date Prep Batch Run #1 2B134393.D 1 09/12/15 BK n/a V2B5988

Run #2

Purge Volume

Run #1 5.0 ml

Run #2

VOA Special List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	10	3.3	ug/l	
71-43-2	Benzene	ND	0.50	0.24	ug/l	
100-41-4	Ethylbenzene	0.30	1.0	0.27	ug/l	J
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	1.0	ug/l	-
108-88-3	Toluene	ND	1.0	0.16	ug/l	
1330-20-7	Xylene (total)	0.65	1.0	0.17	ug/l	J
CAS No.	Surrogate Recoveries	Run#1	Run# 2	Lim	its	
1868-53-7	Dibromofluoromethane	106%		76-1	20%	
17060-07-0	1,2-Dichloroethane-D4	114%		73-1	22%	
2037-26-5	Toluene-D8	105%		84-1	19%	
460-00-4	4-Bromofluorobenzene	105%		78-1	17%	



N = Indicates presumptive evidence of a compound



ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank

Report of Analysis

Page 1 of 1

Client Sample ID: D-1R

Lab Sample ID:

JC3254-24

Matrix:

AQ - Ground Water

Method:

SW846-8015C (DAI)

Project:

BMSMC, Former Tank Farm, PR

Date Sampled:

09/07/15

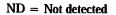
Date Received: 09/10/15

Percent Solids: n/a

Run #1	File ID	DF	Analyzod	By	Prep D	ato	Prep Batch	Analytical Batch
Run #2	GH101450.D	1	09/14/15	XPL	n/a		n/a	GGH5006
CAS No.	Compound		Result	RL	MDL	Units	Q	

CAS No.	Compound	Result	RL	MDL	Uni
67-63-0 67-56-1	Isopropyl Alcohol Methanol	ND ND	100 200	25 45	ug/l ug/l
CAS No.	Surrogate Recoveries	Run#1	Run# 2	Lim	its
111-27-3 111-27-3	Hexanol Hexanol	86% 90%		48-1 48-1	





MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank



Report of Analysis

Page 1 of 1

Client Sample ID: S-31R(2) Lab Sample ID:

JC3254-25

Matrix: Method:

Project:

AQ - Ground Water

SW846 8260C

BMSMC, Former Tank Farm, PR

Date Sampled:

09/07/15 Date Received: 09/10/15

Percent Solids: n/a

Run #1 Run #2	File ID 2B134380.D 2B134381.D	DF 10 100	Analyzed 09/12/15 09/12/15	By BK BK	Prep Date n/a n/a	Prep Batch	Analytical Batch V2B5988 V2B5988
րչուլ #2	ZD134361.1J	100	09/12/13	DK	II/a	n/a	VZB3988

	Purge Volume
Run #1	5.0 ml
Run #2	5.0 ml

VOA Special List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	100	33	ug/l	
71-43-2	Benzene	2.6	5.0	2.4	ug/l	J
100-41-4	Ethylbenzene	3740 a	100	27	ug/l	-
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	50	10	ug/l	
108-88-3	Toluene	ND	10	1.6	ug/l	
1330-20-7	Xylene (total)	ND	10	1.7	ug/l	
CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Lim		
1868-53-7	Dibromofluoromethane	102%	102%	76-1	20%	
17060-07-0	1,2-Dichloroethane-D4	111%	110%	73-1	22%	
2037-26-5	Toluene-D8	105%	104%	84-1	19%	
460-00-4	4-Bromofluorobenzene	105%	105%	78-1	17%	

(a) Result is from Run# 2



ND = Not detected

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B = Indicates analyte found in associated method blank



Matrix:

Method:

Project:

Accutest LabLink@874797 09:10 28-Sep-2015

Report of Analysis

Client Sample ID: S-31R(2) Lab Sample ID: JC3254-25

AQ - Ground Water SW846-8015C (DAI)

BMSMC, Former Tank Farm, PR

Date Sampled: 09/07/15 Date Received: 09/10/15

Percent Solids: n/a

_	 	

Run #1 Run #2	File ID GH101428.D	DF 1	Analyzed 09/14/15	By XPL	Prep D n/a	ate	Prep Batch n/a	Analytical Batch GGH5006
CAS No.	Compound		Result	RL	MDL	Units	Q	
67-63-0	Isopropyl Alcoho	ol	ND	100	25	ug/l		
67-56-1	Methanol		ND	200	45	ug/l		
CAS No.	Surrogate Reco	veries	Run# 1	Run# 2	Lim	its		
111-27-3	Hexanol		88%		48-1	50%		
111-27-3	Hexanol		87%		48-1	50%		



ND = Not detected

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J = Indicates an estimated value

RL = Reporting Limit

B = Indicates analyte found in associated method blank

E = Indicates value exceeds calibration range

N = Indicates presumptive evidence of a compound

Report of Analysis

By

BK

Page 1 of 1

Client Sample ID: S-29R

Lab Sample ID: JC3254-26

File ID

Matrix: Method: AQ - Ground Water

DF

SW846 8260C

Date Sampled: Date Received:

09/07/15 09/10/15

n/a

Prop Date

n/a

Percent Solids: n/a

Project:

BMSMC, Former Tank Farm, PR

Analyzod

09/12/15

Analytical Batch Prep Batch

V2B5988

Run #1 Run #2

Purge Volume

2B134382.D

Run #1 5.0 ml

Run #2

VOA Special List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	10	3.3	ug/l	
71-43-2	Benzene	ND	0.50	0.24	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.27	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	1.0	ug/l	
108-88-3	Toluene	ND	1.0	0.16	ug/ļ	
1330-20-7	Xylene (total)	ND	1.0	0.17	ug/l	
CAS No.	Surrogate Recoveries	Run#1	Run# 2	n#2 Limits		
1868-53-7	Dibromofluoromethane	103%		76-1	20%	
17060-07-0	1,2-Dichloroethane-D4	112%		73-1	22%	
2037-26-5	Toluene-D8	105%		84-1	19%	
460-00-4	4-Bromofluorobenzene	107%		78-1	17%	



ND = Not detected

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111-27-3

111-27-3

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Report of Analysis

Analysis Page 1 of 1

Client Sample ID: S-29R Lab Sample ID: JC3254-26

Matrix: AQ - Ground Water Method: SW846-8015C (DAI)

Hexanol

Hexanol

Project: BMSMC, Former Tank Farm, PR

Date Sampled: 09/07/15
Date Received: 09/10/15
Percent Solids: n/a

Run #1 Run #2	File ID DF GH101431.D 1		Analyzed 09/14/15	By XPL .	-		Prep Batch n/a	Analytical Batch GGH5006
CAS No.	Compound		Result	RL	MDL	Units	Q	
67-63-0 67-56-1	Isopropyl Alco Methanol	hol	ND ND	100 200	25 45	ug/l ug/l		
CAS No.	Surrogate Rec	coveries	Run#1	Run# 2	. Lim	its		

90%

92%



48-150%

48-150%



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Report of Analysis

By

BK

Prop Date

n/a

Page 1 of 1

Client Sample ID: E-1R

Lab Sample ID: JC3254-27

File ID

Matrix: Method: AQ - Ground Water

SW846 8260C

DF

1

Date Sampled: 09/07/15

n/a

Date Received: 09/10/15

Percent Solids: n/a

Project:

BMSMC, Former Tank Farm, PR

Analyzed

09/12/15

Prep Batch

Analytical Batch V2B5988

Run #1 Run #2

Purge Volume

2B134383.D

Run #1 5.0 ml

Run #2

VOA Special List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	10	3.3	ug/l	
71-43-2	Benzene	0.30	0.50	0.24	ug/l	J
100-41-4	Ethylbenzene	ND	1.0	0.27	ug/l	_
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	1.0	ug/l	
108-88-3	Toluene	ND	1.0	0.16	ug/l	
1330-20-7	Xylene (total)	0.75	1.0	0.17	ug/l	J
CAS No.	Surrogate Recoveries	Run# 1	Run# 2	2 Limits		
1868-53-7	Dibromofluoromethane	104%		76-1	20%	
17060-07-0 1,2-Dichloroethane-D4		112%		73-122%		
2037-26-5	Toluene-D8	106%		84-1	19%	
460-00-4	4-Bromofluorobenzene	106%		78-1	17%	



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J = Indicates an estimated value

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Report of Analysis

Prop Date

Page 1 of 1

Client Sample ID: E-1R

File ID

Lab Sample ID:

JC3254-27

Matrix:

AQ - Ground Water

Method: Project:

SW846-8015C (DAI)

DF

BMSMC, Former Tank Farm, PR

Date Sampled: 09/07/15 Date Received: 09/10/15

Q

Percent Solids: n/a

Analytical Batch Prep Batch

By Run #1 GH101432.D 09/14/15 XPL 1 n/a GGH5006 n/a Run #2

Analyzed

CAS No.	Compound	Result	RL	MDL	Unite
67-63-0 67-56-1	Isopropyl Alcohol Methanol	1.57	100 200	25 45	ug/l ug/l
CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Lim	its
111-27-3	Hexanol	89%		48-1	50%
111-27-3	Hexanol	93%		48-1	50%





MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank



Report of Analysis

Ву

BK

Prep Date

n/a

Page 1 of 1

Client Sample ID: G-1R(3)

Lab Sample ID: JC3254-28

File ID

Matrix:

AQ - Ground Water

DF

200

Date Sampled: 09/07/15 Date Received: 09/10/15

V2B5992

Method:

SW846 8260C

n/a

Percent Solids: n/a

Project:

BMSMC, Former Tank Farm, PR

Analyzed

09/15/15

Prep Batch **Analytical Batch**

Run #1 Run #2

Purge Volume

2B134477.D

Run #1 5.0 ml

Run #2

VOA Special List

CAS No.	Compound	Result	RL	MDL	Units	Q	
67-64-1	Acetone	ND	2000	660	ug/l		
71-43-2	Benzene	ND	100	47	ug/l		
100-41-4 Ethylbenzene		28200	200	54	ug/l		
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	1000	200	ug/l		
108-88-3	Toluene	96.0	200	32	ug/l	J	
1330-20-7	Xylene (total)	85300	200	33	ug/l		
CAS No.	Surrogate Recoveries	Run#1	Run# 2	n#2 Limits ·			
1868-53-7	Dibromofluoromethane	104%		76-1	20%		
17060-07-0	1,2-Dichloroethane-D4	113%		73-1	22%		
2037-26-5	Toluene-D8	105%		84-1	19%		
460-00-4	4-Bromofluorobenzene	102%			78-117%		



N = Indicates presumptive evidence of a compound



ND = Not detected

MDL = Method Detection Limit

J = Indicates an estimated value

RL = Reporting Limit

B = Indicates analyte found in associated method blank

E = Indicates value exceeds calibration range

Report of Analysis

Page 1 of 1

Client Sample ID: G-1R(3)

Lab Sample ID: JC3254-28
Matrix: AO - Grow

Hexanol

Hexanol

AQ - Ground Water SW846-8015C (DAI) Date Sampled: 09/07/15
Date Received: 09/10/15
Percent Solids: n/a

Method: Project:

111-27-3

111-27-3

BMSMC, Former Tank Farm, PR

Run #1 Run #2	File ID DF GH101433.D 1		Analyzed 09/14/15	By XPL	Prep Date n/a		Prep Batch n/a	Analytical Batch GGH5006
CAS No.	Compound		Result	RL	MDL	Units	Q	
67-63-0 67-56-1	Isopropyl Alco Methanol	hol	ND ND	100 200	25 45	ug/l ug/l		
CAS No.	Surrogate Rec	overies	Run# 1	Run#	2 Lim	its		

88%

92%



48-150%

48-150%

N = Indicates presumptive evidence of a compound



ND = Not detected

MDL = Method Detection Limit

J = Indicates an estimated value

RL = Reporting Limit

B = Indicates analyte found in associated method blank

E = Indicates value exceeds calibration range

Report of Analysis

By

BK

n/a

Page 1 of 1

Client Sample ID: S-34

Lab Sample ID:

JC3254-29

AQ - Ground Water

DF

1

Date Sampled: 09/09/15 Date Received: 09/10/15

Matrix: Method:

SW846 8260C

Percent Solids: n/a

n/a

Project:

BMSMC, Former Tank Farm, PR

Analyzed

09/12/15

Prep Date Prep Batch **Analytical Batch**

V2B5988

Run #1 Run #2

Purge Volume

2B134386.D

File ID

5.0 ml

Run #1

Run #2

VOA Special List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64 -1	Acetone	ND	10	3.3	ug/l	
71-43-2	Benzene	ND	0.50	0.24	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.27	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	1.0	ug/l	
108-88-3	Toluene	ND	1.0	0.16	ug/l	
1330-20-7	Xylene (total)	ND	1.0	0.17	ug/l	
CAS No.	Surrogate Recoveries	Run#1	Run# 2	Limits		
1868-53-7	Dibromofluoromethane	104%		76-1	20%	
17060-07-0 1,2-Dichloroethane-D4		114%		73-1	22%	
2037-26-5 Toluene-D8		106%		84-1	19%	
460-00-4	4-Bromofluorobenzene	105% 78-117%				





MDL = Method Detection Limit

N = Indicates presumptive evidence of a compound



J = Indicates an estimated value

RL = Reporting Limit

B = Indicates analyte found in associated method blank

E = Indicates value exceeds calibration range

Report of Analysis

Вy

XPL

100

200

Page 1 of 1

Client Sample ID: S-34

Lab Sample ID: Matrix:

JC3254-29

File ID

GH101434.D

AQ - Ground Water

DF

1

Date Sampled: 09/09/15

GGH5006

SW846-8015C (DAI)

Percent Solids: n/a

n/a

Date Received: 09/10/15

Method: Project:

BMSMC, Former Tank Farm, PR

Prep Batch **Analytical Batch**

Run #1 Run #2

CAS No. Compound Result RL MDL Units Q

Analyzed

09/14/15

67-63-0 Isopropyi Alcohol 67-56-1 Methanol

ND ND 25 45

n/a

Prep Date

ug/l

ug/l

CAS No. Surrogate Recoveries Run#1 Run# 2 Limits

111-27-3 Hexanol 87% 111-27-3 Hexanol 93% 48-150% 48-150%



ND = Not detected

MDL = Method Detection Limit

J = Indicates an estimated value

RL = Reporting Limit

B = Indicates analyte found in associated method blank

E = Indicates value exceeds calibration range



Report of Analysis

By

BK

Prop Date

n/a

Page 1 of 1

Client Sample ID: EB090915

Lab Sample ID: JC3254-30

File ID

Matrix:

AQ - Equipment Blank

DF

1

Date Sampled: 09/09/15 Date Received: 09/10/15

Method:

SW846 8260C

n/a

Percent Solids: n/a

Project:

BMSMC, Former Tank Farm, PR

Analyzed

09/12/15

Prep Batch

Analytical Batch V2B5988

Run #1 Run #2

Purge Volume

2B134387.D

Run #1 5.0 ml

Run #2

VOA Special List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	10	3.3	ug/l	
74-87-3	Chloromethane	ND	1.0	0.41	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.27	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	1.0	ug/l	
75-09-2	Methylene chloride	ND	2.0	0.73	ug/l	
108-88-3	Toluene	ND	1.0	0.16	ug/l	
1330-20-7	Xylene (total)	ND	1.0	0.17	ug/l	
CAS No.	Surrogate Recoveries	Run# 1	Run# 2	n#2 Limits		
1868-53-7	Dibromofluoromethane	105%		76-1	20%	
17060-07-0	1,2-Dichloroethane-D4	114%		73-1	22%	
2037-26-5 Toluene-D8		105%		84-1	19%	
460-00-4	4-Bromofluorobenzene	106%	. *	78 -117%		



ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank



Report of Analysis

Client Sample ID: EB090915 Lab Sample ID:

JC3254-30 AQ - Equipment Blank

SW846 8270D BY SIM SW846 3510C

Date Sampled: 09/09/15 Date Received:

09/10/15 Percent Solids: n/a

Method: Project:

Matrix:

BMSMC, Former Tank Farm, PR

File ID DF Analyzed By Prop Date Prop Batch **Analytical Batch** Run #1 a 4M60585.D 1 09/18/15 SW 09/17/15 OP87266A E4M2654 Run #2

Initial Volume Run #1 960 ml

Final Volume 1.0 ml

Run #2

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND J	0.10	0.014	ug/l	
208-96-8	Acenaphthylene	ND J	0.10	0.012	ug/l	
120-12-7	Anthracene	ND J	0.10	0.013	ug/l	
56-55-3	Benzo(a)anthracene	ND J	0.052	0.019	ug/l	
50-32-8	Вепло(а)ругене	ND J	0.052	0.031	ug/l	
205-99-2	Benzo(b)fluoranthene	ND J	0.10	0.022	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND J	0.10	0.027	ug/l	
207-08-9	Benzo(k)fluoranthene	ND J	0.10	0.020	ng/l	
218-01-9	Chrysene	ND J	0.10	0.016	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND J	0.10	0.037	ug/l	
206-44-0	Fluoranthene	ND J	0.10	0.012	ug/l	
86-73-7	Fluorene	ND J	0.10	0.028	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND J	0.10	0.032	ug/l	
91-20-3	Naphthalene	ND J	0.10	0.014	ug/l	
85-01-8	Phenanthrene	ND J	0.10	0.017	ug/l	
129-00-0	Ругене	ND J	0.10	0.014	ug/l	
CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limi	ts	.45
4165-60-0	Nitrobenzene-d5	79%		18-12	28%	MP
321-60-8	2-Fluorobiphenyl	91%		13-12	24%	
1718-51-0	Terphenyl-d14	50%		10-13	27%	

(a) Sample extracted outside the holding time per client's request.



ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank



Report of Analysis

Page 1 of 1

Client Sample ID: EB090915 Lab Sample ID: JC3254-30 Matrix:

AQ - Equipment Blank SW846-8015C (DAI)

Date Sampled: 09/09/15 Date Received: 09/10/15

Method: Project:

BMSMC, Former Tank Farm, PR

Percent Solids: n/a

Run #1	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #2	GH101437.D	1	09/14/15	XPL	n/a	n/a	GGH5006

CAS No.	Compound	Result	RL	MDL	Unit
67-63-0 67-56-1	Isopropyl Alcohol Methanol	ND ND	100 200	25 45	ug/l ug/l
CAS No.	Surrogate Recoveries	Run#1	Run# 2	Limi	its
111-27-3 111-27-3	Hexanol Hexanol	89% 93%		48-1 48-1	



ND = Not detected

MDL = Method Detection Limit

J = Indicates an estimated value

RL = Reporting Limit

B = Indicates analyte found in associated method blank

E = Indicates value exceeds calibration range



Report of Analysis

Page 1 of 1

Client Sample ID: TB090915

Lab Sample ID: JC3254-31 Matrix:

AQ - Ground Water Method: SW846 8260C

BMSMC, Former Tank Farm, PR

Date Sampled: 09/09/15 Date Received: 09/10/15

Percent Solids: n/a

File ID DF Analyzed By Prep Date Prep Batch **Analytical Batch** ВK Run #1 2B134388.D 09/12/15 V2B5988 1 n/a n/a

Run #2

Project:

Purge Volume

Run #1 5.0 ml

Run #2

VOA Special List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	10	3.3	ug/l	
71-43-2	Benzene	ND	0.50	0.24	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.27	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	1.0	ug/l	
108-88-3	Toluene	ND	1.0	0.16	ug/l	
1330-20-7	Xylene (total)	ND	1.0	0.17	ug/l	
CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Lim	its	
1868-53-7	Dibromofluoromethane	106%		76-1	20%	٠,•
17060-07-0	1,2-Dichloroethane-D4	115%		73-1	.22%	
2037-26-5	Toluene-D8	104%		84-1	19%	
460-00-4	4-Bromofluorobenzene	106%		78-1	17%	



ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank



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JC3254: Chain of Custody

Page 1 of 7

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JC3254: Chain of Custody Page 2 of 7

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JC3254: Chain of Custody

Page 5 of 7

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JC3254: Chain of Custody

Page 6 of 7

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JC3254: Chain of Custody Page 7 of 7



Report of Analysis

By

BK

Page 1 of 1

Client Sample ID: MW-15

Lab Sample ID:

JC3254-1

AQ - Ground Water

DF

1

Date Sampled:

Matrix: Method:

SW846 8260C

09/03/15 Date Received: 09/05/15

Percent Solids: n/a

Project:

BMSMC, Former Tank Farm, PR

Analyzed

09/09/15

n/a

Prep Date

Prep Batch n/a

Analytical Batch V2D6208

Run #1 Run #2

Purge Volume

2D147903.D

Run #1

5.0 ml

File ID

Run #2

VOA Special List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	10	3.3	ug/l	
74-87-3	Chloromethane	ND	1.0	0.41	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	1.0	ug/l	
75-09-2	Methylene chloride	ND	2.0	0.73	ug/l	
1330-20-7	Xylene (total)	ND	1.0	0.17	ug/l	
CAS No.	Surrogate Recoveries	Run#1	Run# 2	Lim	its	
1868-53-7	Dibromofluoromethane	108%		76-1	20%	
17060-07-0	1,2-Dichloroethane-D4	111%		73-1	22%	
2037-26-5	Toluene-D8	112%		84-1	19%	
460-00-4	4-Bromofluorobenzene	109%		78-1	17%	





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1.14





MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank

N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: MW-17 Lab Sample ID: JC3254-2

Matrix: Method:

Project:

AQ - Ground Water SW846 8260C

BMSMC, Former Tank Farm, PR

Date Sampled: 09/03/15

Date Received: 09/05/15

Percent Solids: n/a

File ID DF Analyzed By Prep Date Prep Batch **Analytical Batch** Run #1 2B134317.D 09/10/15 BK 1 V2B5985 n/a n/a

Run #2

Purge Volume 5.0 ml

Run #1 Run #2

VOA Special List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	10	3.3	ug/l	
74-87-3	Chloromethane	ND	1.0	0.41	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.27	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	1.0	ug/l	
75-09-2	Methylene chloride	ND	2.0	0.73	ug/l	
108-88-3	Toluene	ND	1.0	0.16	ug/l	
1330-20-7	Xylene (total)	ND	1.0	0.17	ug/l	
CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Lim	its	
1868-53-7	Dibromofluoromethane	109%		76-1	20%	
17060-07-0	1,2-Dichloroethane-D4	105%		73-1	22%	
2037-26-5	Toluene-D8	105%		84-1	19%	
460-00-4	4-Bromofluorobenzene	102%		78-1	17%	



ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

4.5

B = Indicates analyte found in associated method blank



Report of Analysis

By

BK

Page 1 of 1

Client Sample ID: MW-5 Lab Sample ID:

JC3254-3

AQ - Ground Water

Date Sampled: Date Received: 09/05/15

09/03/15

Matrix: Method:

SW846 8260C

Prep Date

n/a

Percent Solids: n/a

Project:

BMSMC, Former Tank Farm, PR

09/12/15

File ID DF Analyzed 1

Prep Batch **Analytical Batch** V2B5989 n/a

Run #1 Run #2

Purge Volume

2B134408.D

Run #1 5.0 ml

Run #2

VOA Special List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	6.1	10	3.3	ug/l	J
74-87-3	Chloromethane	ND	1.0	0.41	ug/l	•
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	1.0	ug/l	
75-09-2	Methylene chloride	ND	2.0	0.73	ug/l	
1330-20-7	Xylene (total)	11.4	1.0	0.17	ug/I	
CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Lim	its	
1868-53-7	Dibromofluoromethane	101%		76-1	20%	
17060-07-0	1,2-Dichloroethane-D4	111%			22%	
2037-26-5	Toluene-D8	104%		84-1		
460-00-4	4-Bromofluorobenzene	103%		78-1		



N = Indicates presumptive evidence of a compound



ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank

Report of Analysis

Page 1 of 1

Client Sample ID: MW-14

Lab Sample ID: Matrix:

JC3254-4 AO - Ground Water

Prep Date

n/a

By

BK

Date Sampled: 09/03/15 Date Received: 09/05/15

Method:

SW846 8260C

DF

1

Percent Solids: n/a

Project:

BMSMC, Former Tank Farm, PR

Analyzed

09/10/15

Prep Batch n/a

Analytical Batch V2B5985

Run #1 Run #2

Purge Volume

2B134319.D

File ID

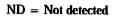
Run #1 5.0 ml

Run #2

VOA Special List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	10	3.3	ug/l	
74-87-3	Chloromethane	ND	1.0	0.41	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	1.0	ug/l	
75-09-2	Methylene chloride	ND	2.0	0.73	ug/l	
1330-20-7	Xylene (total)	0.61	1.0	0.17	ug/I	J
CAS No.	Surrogate Recoveries	Run#1	Run# 2	Lim	its	
1868-53-7	Dibromofluoromethane	106%		76-1	20%	
17060-07-0	1,2-Dichloroethane-D4	102%		73-1	22%	
2037-26-5	Toluene-D8	105%		84-1	19%	
460-00-4	4-Bromofluorobenzene	102%		78-1	17%	





MDL = Method Detection Limit

N = Indicates presumptive evidence of a compound



RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank

Report of Analysis

By

BK

Prop Date

78-117%

n/a

Page 1 of 1

Client Sample ID: QC TB 030915

File ID

Lab Sample ID:

JC3254-5

Matrix:

AQ - Trip Blank Water

DF

1

Method:

SW846 8260C

Date Sampled: Date Received:

09/03/15 09/05/15

Percent Solids: n/a

Project:

BMSMC, Former Tank Farm, PR

Analyzed

09/10/15

Prop Batch **Analytical Batch** n/a V2B5985

Run #1 Run #2

Purge Volume

2B134320.D

Run #1 5.0 ml

Run #2

460-00-4

VOA Special List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	10	3.3	ug/l	
74-87-3	Chloromethane	ND	1.0	0.41	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	1.0	ug/l	
75-09-2	Methylene chloride	ND	2.0	0.73	ug/l	
1330-20-7	Xylene (total)	ND	1.0	0.17	ug/l	
CAS No.	Surrogate Recoveries	Run#1	Run# 2	Lim	its	
1868-53-7	Dibromofluoromethane	107%		76-1	20%	
17060-07-0	1,2-Dichloroethane-D4	103%		73-1	22%	
2037-26-5	Toluene-D8	105%		84-1	19%	

101%





MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

4-Bromofluorobenzene

J = Indicates an estimated value

B = Indicates analyte found in associated method blank



Report of Analysis

Page 1 of 1

Client Sample ID: S-35

Lab Sample ID: Matrix:

JC3254-6

AQ - Ground Water

Date Sampled: Date Received:

09/03/15 09/05/15

Method:

SW846 8260C

Percent Solids: n/a

Project:

BMSMC, Former Tank Farm, PR

Run #1

DF Analyzed 1 09/09/15

By BK Prop Date n/a

Prep Batch n/a

Analytical Batch V2D6208

Run #2

Purge Volume

2D147889.D

Run #1 Run #2 5.0 ml

File ID

VOA Special List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	10	3.3	ug/l	
71-43-2	Benzene	ND	0.50	0.24	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.27	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	1.0	ug/l	
108-88-3	Toluene	ND	1.0	0.16	ug/l	
1330-20-7	Xylene (total)	ND	1.0	0.17	ug/l	
CAS No.	Surrogate Recoveries	Run#1	Run# 2	Limits		
1868-53-7	Dibromofluoromethane	107%		76-1	20%	
17060-07-0	1,2-Dichloroethane-D4	109%		73-1	22%	
2037-26-5	Toluene-D8	113%		84-1	19%	
460-00-4	4-Bromofluorobenzene	112%		78-1	17%	



ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank



Report of Analysis

Page 1 of 1

Client Sample ID: S-35

Lab Sample ID: Matrix:

JC3254-6

AQ - Ground Water

Date Sampled: Date Received:

09/03/15 09/05/15

Method:

SW846-8015C (DAI)

Percent Solids: n/a

Project:

BMSMC, Former Tank Farm, PR

Prop Date	Prep Batch	Analytical Batch			
n/a	n/a	CCH5006			

Run #1 Run #2	File ID DF GH101438.D 1	Analyzed 09/14/15	By XPL	Prep Date n/a		Prep Batch n/a	Analytica GGH5000
CAS No.	Compound	Result	RL	MDL	Units	Q	
67-63-0 67-56-1	Isopropyl Alcohol Methanol	ND ND	100 200	25 45	ug/l ug/l		
CAS No.	Surrogate Recoveries	Run#1	Run# 2	Lim	its		
111-27-3 111-27-3	Hexanol Hexanol	86% 88%			150% 150%		



ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank



4.7 4

Accutest LabLink@874797 09:10 28-Sep-2015

Report of Analysis

Page 1 of 1

Client Sample ID: S-35D Lab Sample ID: JC3254-7 Matrix: AO - Gro

AQ - Ground Water SW846 8260C Date Sampled: 09/03/15
Date Received: 09/05/15
Percent Solids: n/a

Method: Project:

BMSMC, Former Tank Farm, PR

File ID DF Analyzed By Prop Date Prep Batch **Analytical Batch** Run #1 2D147890.D 1 09/09/15 BK n/a n/a V2D6208 Run #2

Purge Volume
Run #1 5.0 ml
Run #2

VOA Special List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1 71-43-2 100-41-4 108-10-1 108-88-3 1330-20-7	Acetone Benzene Ethylbenzene 4-Methyl-2-pentanone(MIBK) Toluene Xylene (total)	ND ND ND ND ND ND	10 0.50 1.0 5.0 1.0	3.3 0.24 0.27 1.0 0.16 0.17	ug/l ug/l ug/l ug/l ug/l ug/l	
CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits		
1868-53-7 17060-07-0 2037-26-5 460-00-4	Dibromofluoromethane 1,2-Dichloroethane-D4 Toluene-D8 4-Bromofluorobenzene	109% 108% 112% 111%		76-12 73-12 84-12 78-12	22% 19%	



ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank



Report of Analysis

Page 1 of 1

Client Sample ID: S-35D Lab Sample ID: JC3254-7

Matrix: Method:

CAS No.

111-27-3

111-27-3

AQ - Ground Water

Date Sampled: Date Received: 09/05/15

09/03/15

SW846-8015C (DAI)

Percent Solids: n/a

Project: BMSMC, Former Tank Farm, PR

Surrogate Recoveries

Hexanol

Hexanol

Run #1 Run #2	File ID GH101439.D	DF 1	Analyzed 09/14/15	By XPL	Prep D n/a	Date	Prep Batch n/a	Analytical Batch GGH5006
CAS No.	Compound		Result	RL	MDL	Units	Q	
67-63-0	Isopropyl Alco	hol	ND	100	25	ug/l		
67-56-1	Methanol		ND	200	45	ug/l		

Run#2

Limits

48-150%

48-150%

Run#1

87%

90%



ND = Not detected

MDL = Method Detection Limit

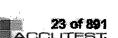
RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank

N = Indicates presumptive evidence of a compound



JG8254

Report of Analysis

By

BK

Page 1 of 1

Client Sample ID: S-36

Date Sampled:

Lab Sample ID: Matrix:

JC3254-8 AQ - Ground Water

Date Received:

09/03/15 09/05/15

Method:

SW846 8260C

DF

1

Prop Date

n/a

Percent Solids:

Project:

BMSMC, Former Tank Farm, PR

Analyzed

09/09/15

Prep Batch n/a

Analytical Batch V2D6208

Run #1 Run #2

Purge Volume

2D147891.D

File ID

Run #1 5.0 ml

Run #2

VOA Special List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	10	3.3	ug/l	
71-43-2	Benzene	ND	0.50	0.24	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.27	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	1.0	ug/l	
108-88-3	Toluene	ND	1.0	0.16	ug/l	
1330-20-7	Xylene (total)	ND	1.0	0.17	ug/l	
CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Lim	its	
1868-53-7	Dibromofluoromethane	106%		76-1	20%	
17060-07-0	1,2-Dichloroethane-D4	110%		73-1	22%	
2037-26-5	Toluene-D8	112%		84-1	19%	
460-00-4	4-Bromofluorobenzene	112%		78-1	17%	



ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank

N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: S-36

Lab Sample ID: JC3254-8

Matrix: Method:

Project:

AQ - Ground Water

SW846-8015C (DAI)

BMSMC, Former Tank Farm, PR

Date Sampled:

Q

09/03/15 Date Received: 09/05/15

Percent Solids: n/a

Run #1	File ID	DF 1	Analyzed	By	Prep Date	Prop Batch	Analytical Batch
Run #2	GH101440.D		09/14/15	XPL	n/a	n/a	GGH5006

CAS No.	Compound	Result	RL	MDL	Units
67-63-0 67-56-1	Isopropyl Alcohol Methanol	ND ND	100 200	25 45	ug/l ug/l
CAS No.	Surrogate Recoveries	Run#1	Run# 2	Limi	its



ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank



Report of Analysis

Page 1 of 1

Client Sample ID: S-32 Lab Sample ID:

JC3254-9

Date Sampled:

Date Received:

09/03/15 09/05/15

Matrix: Method: AQ - Ground Water SW846 8260C

Percent Solids: n/a

Project:

BMSMC, Former Tank Farm, PR

File ID DF Analyzed Prop Date Prep Batch By **Analytical Batch** Run #1 2B134560.D 100 09/17/15 BK n/a n/a V2B5996 Run #2 2B134561.D 1000 09/17/15 BK n/a n/a V2B5996

Purge Volume Run #1 5.0 ml Run #2 5.0 ml

VOA Special List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	1000	330	ug/l	
71-43-2	Benzene	ND	50	24	ug/l	
100-41-4	Ethylbenzene	44800 a	1000	270	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	500	100	ug/l	
108-88-3	Toluene	49.7	100	16	ug/l	J.
1330-20-7	Xylene (total)	71900 a	1000	170	ug/l	
CAS No.	Surrogate Recoveries	Run#1	Run# 2	Limits		
1868-53-7	Dibromofluoromethane	106%	105%	76-1	20%	
17060-07-0	1,2-Dichloroethane-D4	119%	119%	73-1	22%	
2037-26-5	Toluene-D8	105%	103%	84-1	19%	
460-00-4	4-Bromofluorobenzene	104%	103%	78-1	17%	

(a) Result is from Run# 2



ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank



Report of Analysis

Page 1 of 1

Client Sample ID: S-32 Lab Sample ID:

Matrix:

JC3254-9

AQ - Ground Water

Date Sampled: 09/03/15 Date Received: 09/05/15

Method: SW846-8015C (DAI)

Percent Solids: n/a

BMSMC, Former Tank Farm, PR Project:

Run #1 Run #2	File ID GH101441.D	DF 1	Analyzed 09/14/15	By XPL	Prep D n/a	ate	Prep Batch n/a	Analytical Batch GGH5006
CAS No.	Compound		Result	RL	MDL	Units	Q	
67-63-0 67-56-1	Isopropyl Alco Methanol	ohol	ND ND	100 200	25 45	ug/l ug/l		
CAS No.	Surrogate Re	coveries	Run# 1	Run#	2 Lim	its		
111-27-3 111-27-3	Hexanol Hexanol		87% 102%			.50% .50%		



ND = Not detected

MDL = Method Detection Limit

J = Indicates an estimated value

RL = Reporting Limit

E = Indicates value exceeds calibration range

B = Indicates analyte found in associated method blank N = Indicates presumptive evidence of a compound



Report of Analysis

Page 1 of 1

Client Sample ID: S-33

Lab Sample ID:

JC3254-10

Matrix: Method: AQ - Ground Water

DF

1

SW846 8260C

Date Sampled: Date Received:

09/03/15 09/05/15

Percent Solids: n/a

Project: BMSMC, Former Tank Farm, PR

Run #1

File ID 2B134438.D

Analyzed 09/14/15

By BK Prop Date n/a

Prep Batch n/a

Analytical Batch

V2B5990

Run #2

Purge Volume

Run #1 5.0 ml

Run #2

CAS No.	Compound.	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	10	3.3	ug/l	
71-43-2	Benzene	ND	0.50	0.24	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.27	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	1.0	ug/l	
108-88-3	Toluene	ND	1.0	0.16	ug/l	
1330-20-7	Xylene (total)	ND	1.0	0.17	ug/l	
CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Lim	its	
1868-53-7	Dibromofluoromethane	102%		76-1	20%	
17060-07-0	1,2-Dichloroethane-D4	111%		73-1	22%	
2037-26-5	Toluene-D8	106%		84-1	19%	
460-00-4	4-Bromofluorobenzene	104%		78-1	17%	



N = Indicates presumptive evidence of a compound



ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank

Report of Analysis

Page 1 of 1

Client Sample ID: S-33

Lab Sample ID: JC3254-10

Matrix: Method: AQ - Ground Water

SW846-8015C (DAI)

Date Sampled: 09/03/15 Date Received: 09/05/15

Q

Percent Solids: n/a

BMSMC, Former Tank Farm, PR

		-					
	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GH101442.D	1	09/14/15	XPL	n/a	n/a ¯	GGH5006
Run #2							

Project:

CAS No.	Compound	Result	RL	MDL	Units
67-63-0	Isopropyl Alcohol	ND	100	25	ug/l
67-56-1	Methanol	ND	200	45	ug/l
CAS No.	Surrogate Recoveries	Run#1	Run# 2	Lim	its
111-27-3	Hexanol	85%		48-1	.50%
111-27-3	Hexanol	90%		48-1	50%





MDL = Method Detection Limit

RL = Reporting Limit E = Indicates value exceeds calibration range J = Indicates an estimated value

B = Indicates analyte found in associated method blank



Report of Analysis

Page 1 of 1

Client Sample ID: MW-18

Lab Sample ID:

JC3254-11

Matrix: Method: AQ - Ground Water

SW846 8260C

Date Sampled: Date Received: 09/10/15

09/04/15

Percent Solids: n/a

Project:

BMSMC, Former Tank Farm, PR

Run #1

File ID DF 2B134478.D 1

Analyzod 09/15/15

By BK Prop Date n/a

Prep Batch n/a

Analytical Batch V2B5992

Run #2

Purge Volume

Run #1 5.0 ml

Run #2

VOA Special List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	10	3.3	ug/l	
74-87-3	Chloromethane	ND	1.0	0.41	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.27	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	1.0	ug/l	
75-09-2	Methylene chloride	ND	2.0	0.73	ug/l	
108-88-3	Toluene	0.31	1.0	0.16	ug/l	J
1330-20-7	Xylene (total)	2.4	1.0	0.17	ug/l	
CAS No.	Surrogate Recoveries	Run#1	Run# 2	Lim	its	
1868-53-7	Dibromofluoromethane	104%		76-1	20%	
17060-07-0	1,2-Dichloroethane-D4	114%		73-1	22%	
2037-26-5	Toluene-D8	105%		84-1	19%	
460-00-4	4-Bromofluorobenzene	103%		78-1	17%	



ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank



Report of Analysis

By

BK

Page 1 of 1

Client Sample ID: MW-3

Lab Sample ID: Matrix:

JC3254-12

AQ - Ground Water

DF

1

Date Sampled: 09/04/15 Date Received: 09/10/15

Method:

SW846 8260C

Percent Solids: n/a

Project:

BMSMC, Former Tank Farm, PR

Analyzed

09/16/15

Prep Batch n/a

Prop Date

n/a

Analytical Batch V2B5994

Run #1 Run #2

Purge Volume

2B134538.D

File ID

Run #1 5.0 ml

Run #2

VOA Special List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	10	3.3	ug/l	
74-87-3	Chloromethane	ND	1.0	0.41	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	1.0	ug/l	
75-09-2	Methylene chloride	ND	2.0	0.73	ug/l	
1330-20-7	Xylene (total)	1.9	1.0	0.17	ug/l	
CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Lim	its	
1868-53-7	Dibromofluoromethane	100%		76-1	20%	
17060-07-0	1,2-Dichloroethane-D4	113%		73-1	22%	
2037-26-5	Toluene-D8	103%		84-1	19%	
460-00-4	4-Bromofluorobenzene	100%		78-1	17%	



ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank



Report of Analysis

Page 1 of 1

Client Sample ID: MW-13 Lab Sample ID: JC3254-13

Matrix: Method:

Project:

AQ - Ground Water

SW846 8260C

BMSMC, Former Tank Farm, PR

Date Sampled: 09/08/15 Date Received: 09/10/15

Percent Solids: n/a

Ву File ID DF Analyzed Prep Date Prep Batch **Analytical Batch** Run #1 2B134439.D 09/14/15 BK 1 n/a n/a V2B5990

Run #2

Purge Volume

Run #1 5.0 ml

Run #2

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	10	3.3	ug/l	
74-87-3	Chloromethane	ND	1.0	0.41	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	1.0	ug/l	
75-09-2	Methylene chloride	ND	2.0	0.73	ug/l	
1330-20-7	Xylene (total)	ND	1.0	0.17	ug/l	
CAS No.	Surrogate Recoveries	Run#1	Run# 2	Lim	its	
1868-53-7	Dibromofluoromethane	102%		76-1	20%	
17060-07-0	1,2-Dichloroethane-D4	112%		73-1	22%	
2037-26-5	Toluene-D8	104%		84-1	19%	
460-00-4	4-Bromofluorobenzene	103%		78-1	17%	



N = Indicates presumptive evidence of a compound



ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank

Report of Analysis

Page 1 of 1

Client Sample ID: MW-13D Lab Sample ID: JC3254-14 Matrix: AO - Groun

AQ - Ground Water

Date Sampled: (Date Received: (

09/08/15 09/10/15

Method: Project: SW846 8260C BMSMC, Former Tank Farm, PR Percent Solids: n/a

File ID DR Analyzad By Bren Date

File ID DF Analyzed By Prep Date Prep Batch Analytical Batch
Run #1 2B134536.D 1 09/16/15 BK n/a n/a V2B5994

Run #2

Purge Volume

Run #1 5.0 ml

Run #2

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	10	3.3	ug/l	
74-87-3	Chloromethane	ND	1.0	0.41	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	1.0	ug/l	
75-09-2	Methylene chloride	ND	2.0	0.73	ug/l	
1330-20-7	Xylene (total)	ND	1.0	0.17	ug/l	
CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Lim	its	
1868-53-7	Dibromofluoromethane	99%		76-1	20%	
17060-07-0	1,2-Dichloroethane-D4	112%		73-1	22%	
2037-26-5	Toluene-D8	103%		84-1	19%	
460-00-4	4-Bromofluorobenzene	104%		78 -1	17%	



B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound



ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

Report of Analysis

By

BK

Page 1 of 1

Client Sample ID: MW-7

Lab Sample ID:

JC3254-15

Matrix:

AQ - Ground Water

DF

1

SW846 8260C

Date Sampled: 09/08/15

Date Received: 09/10/15

Percent Solids: n/a

Method: Project:

BMSMC, Former Tank Farm, PR

Analyzed

09/16/15

Prep Batch

Prop Date

n/a

Analytical Batch V2B5994

Run #1 Run #2

Purge Volume

2B134537.D

File ID

Run #1 5.0 ml

Run #2

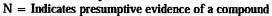
CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	10	3.3	ug/l	
74-87-3	Chloromethane	ND	1.0	0.41	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	1.0	ug/l	
75-09-2	Methylene chloride	ND	2.0	0.73	ug/l	
1330-20-7	Xylene (total)	32.3	1.0	0.17	ug/l	
CAS No.	Surrogate Recoveries	Run#1	Run# 2	Limi	its	
1868-53-7	Dibromofluoromethane	101%		76-12	20%	
17060-07-0	1,2-Dichloroethane-D4	113%		73-13	22%	
2037-26-5	Toluene-D8	102%		84 -11	19%	
460-00-4	4-Bromofluorobenzene	103%		78-1 3	17%	





MDL = Method Detection Limit

B = Indicates analyte found in associated method blank





RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

Report of Analysis

Page 1 of 1

Client Sample ID: MW-16

Lab Sample ID:

JC3254-16

Matrix: Method: AQ - Ground Water

SW846 8260C

BMSMC, Former Tank Farm, PR

Date Sampled: Date Received:

09/08/15 09/10/15

Percent Solids: n/a

Project:

File ID Run #1 2B134400.D

DF 1

Analyzed By 09/12/15 BK Prep Date n/a

Prep Batch n/a

Analytical Batch V2B5989

Run #2

Purge Volume

Run #1 5.0 ml

Run #2

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	10	3.3	ug/l	
74-87-3	Chloromethane	ND	1.0	0.41	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	1.0	ug/l	
75-09-2	Methylene chloride	ND	2.0	0.73	ug/l	
1330-20-7	Xylene (total)	ND	1.0	0.17	ug/l	
CAS No.	Surrogate Recoveries	Run#1	Run# 2	Lim	its	
1868-53-7	Dibromofluoromethane	105%		76-1	20%	
17060-07-0	1,2-Dichloroethane-D4	113%		73-1	22%	
2037-26-5	Toluene-D8	104%		84-1	19%	
460-00-4	4-Bromofluorobenzene	104%		78-1	17%	



N = Indicates presumptive evidence of a compound



ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank

Report of Analysis

By

BK

Page 1 of 1

Client Sample ID: MW-12 Lab Sample ID:

Matrix:

JC3254-17

AQ - Ground Water

Date Sampled: 09/09/15 Date Received: 09/10/15

Method:

SW846 8260C

Percent Solids: n/a

Project:

BMSMC, Former Tank Farm, PR

File ID DF Analyzed Run #1 2B134401.D 1 09/12/15

Prep Date n/a

Prep Batch n/a

Analytical Batch V2B5989

Run #2

Purge Volume

Run #1 5.0 ml

Run #2

VOA Special List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	10	3.3	ug/l	
74-87-3	Chloromethane	ND	1.0	0.41	ug/l	
100-41-4	Ethylbenzene	2.3	1.0	0.27	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	1.0	ug/l	
75-09-2	Methylene chloride	ND	2.0	0.73	ug/l	
108-88-3	Toluene	0.19	1.0	0.16	ug/l	T
1330-20-7	Xylene (total)	0.65	1.0	0.17	ug/l	Ĵ
CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Lim	its	
1868-53-7	Dibromofluoromethane	107%		76-1	20%	
17060-07-0	1,2-Dichloroethane-D4	115%			22%	
2037-26-5	Toluene-D8	106%			19%	
460-00-4	4-Bromofluorobenzene	102%			17%	



ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank



Report of Analysis

Page 1 of 1

Client Sample ID: MW-12 Lab Sample ID: JC3254-17

Matrix: Method:

Project:

AQ - Ground Water

SW846 8270D BY SIM SW846 3510C BMSMC, Former Tank Farm, PR

Date Sampled: 09/09/15 Date Received: 09/10/15

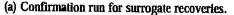
Percent Solids: n/a

Run #1	File ID 3M57746.D	DF	Analyzed	Ву	Prop Date	Prep Batch	Analytical Batch
Run #2 a	4M60722.D	1	09/17/15 09/24/15	LK LK	09/15/15 09/18/15	OP87215A OP87321A	E3M2675 E4M2661

	Initial Volume	Final Volume
Run #1 Run #2	900 ml	1.0 ml
Run #2	950 ml	1.0 ml

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	0.350	0.11	0.015	ug/I	
208-96-8	Acenaphthylene	ND	0.11	0.013	ug/l	
120-12-7	Anthracene	ND J	0.11	0.014	ug/l	
56-55-3	Benzo(a)anthracene	ND	0.056	0.021	ug/I	
50-32-8	Benzo(a)pyrene	ND	0.056	0.033	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	0.11	0.023	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	0.11	0.029	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	0.11	0.021	ug/l	
218-01-9	Chrysene	ND	0.11	0.017	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	0.11	0.039	ug/l	
206-44-0	Fluoranthene	ND	0.11	0.012	ug/l	
86-73-7	Fluorene	1.05	0.11	0.030	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.11	0.035	ug/l	
91-20-3	Naphthalene	1.57	0.11	0.015	ug/I	
85-01-8	Phenanthrene	0.251	0.11	0.018	ug/I	
129-00-0	Pyrene	ND	0.11	0.015	ug/l	
CAS No.	Surrogate Recoveries	Run#1	Run# 2	Lim	its	
4165-60-0	Nitrobenzene-d5	2% c	0% b	18-1	28%	
321-60-8	2-Fluorobiphenyl	59%	72%		24%	
1718-51-0	Terphenyl-d14	22%	36%	10-1		



(b) Outside control limits due to matrix interference.

(c) Outside control limits due to matrix interference. Confirmed by re-extraction.



ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank



Report of Analysis

Page 1 of 1

Client Sample ID: MW-12D Lab Sample ID: JC3254-18

Matrix: Method: AQ - Ground Water SW846 8260C

Date Sampled: 09/09/15 Date Received: 09/10/15

Percent Solids: n/a

Project:

BMSMC, Former Tank Farm, PR

Run #1 Run #2 File ID DF 2B134402.D 1

Analyzed By 09/12/15 BK Prep Date n/a

Prep Batch n/a

Analytical Batch

V2B5989

Purge Volume

Run #1 5.0 ml

Run #2

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	10	3.3	ug/l	
74-87-3	Chloromethane	ND	1.0	0.41	ug/l	
100-41-4	Ethylbenzene	2.3	1.0	0.27	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	1.0	ug/l	
75-09-2	Methylene chloride	ND	2.0	0.73	ug/l	
108-88-3	Toluene	0.17	1.0	0.16	ug/l	J
1330-20-7	Xylene (total)	0.66	1.0	0.17	ug/l	J
CAS No.	Surrogate Recoveries	Run#1	Run# 2	2 Limits		
1868-53-7	Dibromofluoromethane	104%		76-1	.20%	
17060-07-0	1,2-Dichloroethane-D4	113%	73-122%			
2037-26-5	Toluene-D8	106%	84-119%			
460-00-4	4-Bromofluorobenzene	102%		78-1	17%	



N = Indicates presumptive evidence of a compound



ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank

Lab Sample ID:

JC3254-18

AQ - Ground Water

Date Sampled: 09/09/15 Date Received: 09/10/15

Matrix: Method:

SW846 8270D BY SIM SW846 3510C

Percent Solids: n/a

Project:

BMSMC, Former Tank Farm, PR

	File ID
Run #1	3M5774
Run #2 a	4M6072
C	

DF 17.D 1 23.D 1

Analyzed By 09/17/15 LK 09/24/15 LK Prop Date 09/15/15 09/18/15

Prop Batch OP87215A OP87321A

Analytical Batch E3M2675 E4M2661

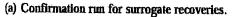
	L
Run #1	9
Run #2	9

nitial Volume Final Volume 50 ml 1.0 ml

950 ml 1.0 ml

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	0.351	0.11	0.014	ug/l	
208-96-8	Acenaphthylene	ND	0.11	0.012	ug/I	
120-12-7	Anthracene	ND J	0.11	0.014	ug/l	
56-55-3	Benzo(a)anthracene	ND	0.053	0.019	ug/l	
50-32-8	Benzo(a)pyrene	ND	0.053	0.031	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	0.11	0.022	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	0.11	0.028	ug/I	
207-08-9	Benzo(k)fluoranthene	ND	0.11	0.020	ug/l	
218-01-9	Chrysene	ND	0.11	0.016	ug/I	
53-70-3	Dibenzo(a,h)anthracene	ND	0.11	0.037	ug/l	
206-44-0	Fluoranthene	0.116	0.11	0.012	ug/l	
86-73-7	Fluorene	1.07	0.11	0.028	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.11	0.033	ug/l	
91-20-3	Naphthalene	1.66	0.11	0.014	ug/l	
85-01-8	Phenanthrene	0.296	0.11	0.017	ug/l	
129-00-0	Pyrene	ND	0.11	0.014	ug/l	
CAS No.	Surrogate Recoveries	Run#1	Run# 2	Lim	its	
4165-60-0	Nitrobenzene-d5	2% c	0% b	18-1	28%	
321-60-8	2-Fluorobiphenyl	56%	78%		24%	
1718-51-0	Terphenyl-d14	26%	33%		27%	



(b) Outside control limits due to matrix interference.

(c) Outside control limits due to matrix interference. Confirmed by re-extraction.



ND = Not detected

MDL = Method Detection Limit

J = Indicates an estimated value

RL = Reporting Limit

B = Indicates analyte found in associated method blank

E = Indicates value exceeds calibration range

N = Indicates presumptive evidence of a compound

Report of Analysis

By

BK

Page 1 of 1

Client Sample ID: QC TB 090915

File ID

Lab Sample ID: Matrix:

JC3254-19

AQ - Trip Blank Water

DF

1

Date Sampled: 09/09/15 Date Received:

09/10/15

Method:

SW846 8260C

Percent Solids: n/a

Project:

BMSMC, Former Tank Farm, PR

Analyzed

09/12/15

Prep Batch n/a

Prep Date

n/a

Analytical Batch V2B5989

Run #1 Run #2

Purge Volume

2B134403.D

Run #1 5.0 ml

Run #2

VOA Special List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	10	3.3	ug/l	
74-87-3	Chloromethane	ND	1.0	0.41	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	1.0	ug/l	
75-09-2	Methylene chloride	ND	2.0	0.73	ug/l	
1330-20-7	Xylene (total)	ND	1.0	0.17	ug/l	
CAS No.	Surrogate Recoveries	Run#1	Run# 2	Lim	its	
1868-53-7	Dibromofluoromethane	102%		76-1	20%	
17060-07-0	1,2-Dichloroethane-D4	110%		73-1	22%	
2037-26-5	Toluene-D8	103%		84-1	19%	
460-00-4	4-Bromofluorobenzene	104%		78 -1	17%	



ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit E = Indicates value exceeds calibration range J = Indicates an estimated value

B = Indicates analyte found in associated method blank



Report of Analysis

By

BK

n/a

Page 1 of 1

Client Sample ID: A-IR(4)

File ID

Lab Sample ID:

JC3254-20

Matrix: Method: Project:

AQ - Ground Water

DF

25

SW846 8260C

BMSMC, Former Tank Farm, PR

Analyzed

09/15/15

Date Sampled: Date Received: 09/10/15

09/04/15

Percent Solids: n/a

Prep Date Prep Batch **Analytical Batch** n/a V2B5992

Run #1 Run #2

Purge Volume

2B134480.D

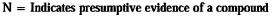
Run #1 5.0 ml

Run #2

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	250	83	ug/l	
71-43-2	Benzene	ND	13	5.9	ug/l	
100-41-4	Ethylbenzene	2820	25	6.7	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	130	25	ug/l	
108-88-3	Toluene	49.1	25	4.1	ug/l	
1330-20-7	Xylene (total)	9490	25	4.1	ug/l	
CAS No.	Surrogate Recoveries	Run#1	Run# 2	Lim	its	
1868-53-7	Dibromofluoromethane	102%		76-1	20%	
17060-07-0	1,2-Dichloroethane-D4	111%		73-1	22%	
2037-26-5	Toluene-D8	106%		84-1	19%	
460-00-4	4-Bromofluorobenzene	105%		78-1	17%	



B = Indicates analyte found in associated method blank





ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

Report of Analysis

Page 1 of 1

Client Sample ID: A-IR(4)

Lab Sample ID:

JC3254-20

Matrix: Method: Project:

AQ - Ground Water

SW846-8015C (DAI)

BMSMC, Former Tank Farm, PR

Date Sampled: 09/04/15 Date Received: 09/10/15

Percent Solids: n/a

Run #1	File ID	DF	Analyzed	By	Prep Da	ute	Prep Batch	Analytical Batch
Run #2	GH101443.D	1	09/14/15	XPL	n/a		n/a	GGH5006
CAS No.	Compound		Result	RL	MDL	Units	Q	

67-63-0	Isopropyl Alcohol	ND	100	25 ug/l
67-56-1	Methanol	ND	200	45 ug/l
CAS No.	Surrogate Recoveries	Run#1	Run# 2	Limits
111-27-3	Hexanol	79%		48-150%
111-27-3	Hexanol	83%		48-150%



ND = Not detected

MDL = Method Detection Limit

J = Indicates an estimated value

RL = Reporting Limit

 $B = Indicates \ analyte \ found \ in \ associated \ method \ blank$

E = Indicates value exceeds calibration range



Report of Analysis

Ву

BK

Page 1 of 1

Client Sample ID: A-2R(2)

File ID

5.0 ml

Lab Sample ID: Matrix:

JC3254-21

AQ - Ground Water

Date Received: 09/10/15

Date Sampled: 09/04/15

Method:

SW846 8260C

Percent Solids: n/a

Project:

BMSMC, Former Tank Farm, PR

Run #1

DF Analyzed 1 09/12/15

Prep Date n/a

Prep Batch n/a

Analytical Batch V2B5988

Run #2

Purge Volume

2B134390.D

Run #1

Run #2

VOA Special List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	10	3.3	ug/l	
71-43-2	Benzene	ND	0.50	0.24	ug/l	
100-41-4	Ethylbenzene	19.9	1.0	0.27	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	1.0	ug/l	
108-88-3	Toluene	0.68	1.0	0.16	ug/l	J
1330-20-7	Xylene (total)	89.8	1.0	0.17	ug/l	-
CAS No.	Surrogate Recoveries	Run#1	Run# 2	Lim	its	
1868-53-7	Dibromofluoromethane	105%		76-1	20%	
17060-07-0	1,2-Dichloroethane-D4	116%		73-1	22%	
2037-26-5	Toluene-D8	105%		84-1	19%	
460-00-4	4-Bromofluorobenzene	104%		78 -1	17%	

ND = Not detected

MDL = Method Detection Limit

J = Indicates an estimated value

B = Indicates analyte found in associated method blank N = Indicates presumptive evidence of a compound



Report of Analysis

By

Page 1 of 1

Client Sample ID: A-2R(2) Lab Sample ID: JC3254-21 Matrix:

File ID

AQ - Ground Water SW846-8015C (DAI)

DF

09/04/15 Date Sampled: Date Received: 09/10/15 Percent Solids: n/a

Method: Project:

BMSMC, Former Tank Farm, PR

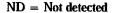
Prep Date Prop Batch **Analytical Batch**

GGH5006

Run #1 Run #2	GH101444.D 1	09/14/15	XPL	n/a		n/a
CAS No.	Compound	Rosult	RL	MDL	Units	Q
67-63-0 67-56-1	Isopropyl Alcohol Methanol	ND ND	100 200	25 45	ug/l ug/l	
CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Lim	its	
111-27-3 111-27-3	Hexanol Hexanol	86% 89%			150% 150%	

Analyzed





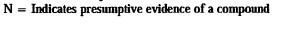
MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank





Report of Analysis

Client Sample ID: VP-1 UP-17 Lab Sample ID: JC3254-22

Matrix:

AQ - Ground Water

Method: Project:

SW846 8260C

BMSMC, Former Tank Farm, PR

Date Sampled: 09/04/15 Date Received: 09/10/15

Percent Solids: n/a

File ID DF Analyzed **Analytical Batch** By Prep Date Prop Batch Run #1 2B134391.D 1 09/12/15 BK n/a n/a V2B5988

Run #2

Purge Volume

Run #1 5.0 ml

Run #2

VOA Special List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	10	3.3	ug/l	
71-43-2	Benzene	ND	0.50	0.24	ug/l	
100-41-4	Ethylbenzene	3.7	1.0	0.27	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	1.0	ug/l	
108-88-3	Toluene	ND	1.0	0.16	ug/l	
1330-20-7	Xylene (total)	3.7	1.0	0.17	ug/l	
CAS No.	Surrogate Recoveries	Run#1	Run# 2	Lim	its	
1868-53-7	Dibromofluoromethane	106%		76-1	.20%	
17060-07-0	1,2-Dichloroethane-D4	115%		73-1	.22%	
2037-26-5	Toluene-D8	104%		84-1	.19%	
460-00-4	4-Bromofluorobenzene	106%		78-1	17%	



ND = Not detectedRL = Reporting Limit MDL = Method Detection Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank



	Project Number:_	JC3254
	Date:	09/09-05/2015
REVIEW OF VOLATILE ORGA	ANIC PACKAGE	taraka manuirad validation
	HAD OF DOTO OF	ineate required validation
The following guidelines for evaluating volatile organics vactions. This document will assist the reviewer in using placetions. The document will assist the reviewer in using placetions.	rofessional judgmen	to make more informed
actions. This document will assist the reviewer in using placetions. This document will assist the reviewer in using placetions. This document will assist the reviewer in using placetions. This document will be reviewed as the reviewer in using placetions.	he sample results w	ere assessed according to
decision and in better serving the needs of the data users. I USEPA data validation guidance documents in the following	order of precedence	e: USEPA Region 2, SUP
USEPA data validation guidance documents in the following HW-24, Standard Operating Procedure for the Validation of	Organic Data Acqui	red using SW-846 Method
HW-24, Standard Operating Procedure for the Validation of 8260B (August, 2009-Revision 2), the USEPA Nation 8260B (August, 2009-Revision 2), the USEPA Nation (SOM SOMO) 2 SOP I	nal Functional Gui	idelines for Low/Medium
8260B (August, 2009-Revision 2), the USEPA Nation Concentration Organic Data Review (SOW SOM01.2 SOP For Review for Land Concentration Organic Data Review for Land Concentration Organic Data Review for Land Concentration	+W-33. August 2009	 Revision 2), the USEPA
Concentration Organic Data Review (SOW SOM01.2 SOP Review (SOW SOM01.2 SOP Review for Least National Functional Guidelines for Organic Data Review for Least National Functional Guidelines for Organic Toot, Methods for the South Review from Toot, Methods for the South Review for the South	ow Concentration W	later (SOP HW-13, August,
National Functional Guidelines for Organic Data Novion is	or Evaluating Solid	Waste, Physical/Chemical
National Functional Guidelines for Organic Data Review for L 2009-Revision 3). Also, QC criteria from "Test Methods f Methods SW-846 (Final Update III, December 1996)," specified on the data re-	ically for Methods 80	000/8260B are utilized. The
Methods SW-846 (Final Update III, December 1990), specific	view worksheets are	from the primary guidance
OC criteria and data validation actions listed on the data to	TON MONEY	
document, unless otherwise noted.	data na	ackage received has been
The hardcopied (laboratory name) _Accutest	morized. The data re	view for VOCs included:
The hardcopied (laboratory name) _Accutest reviewed and the quality control and performance data sumr	Halized. The data to	
		ix:Groundwater
Lab. Project/SDG No.:JC3254		
No. of Samples:35	_	
Trip blank No.:JC3254-5;_JC3254-19;_JC3254-3	34	
Trip blank No.:JC3254-5;_JC3254-19;_JC3254-3)1	
Field blank No.:		
Equipment blank No.: JC3254-30		
Equipment blank No.:JC3254-30 Field duplicate No.:JC3254-13/JC3254-14;_JC32	254-17/JC3254-18_	
1 Idia dapiloata 1 101		notory Control Snikes
X Data Completeness	X Labo	ratory Control Spikes
X Bala sompted	X Field	Duplicates
X GC/MS Tuning	X Calik	prations
X GC/MS TullingX Internal Standard Performance	XCom	pound Identifications
	X Com	pound Quantitation
XBlanks	X Qua	ntitation Limits
X Surrogate Recoveries		
X Matrix Spike/Matrix Spike Duplicate		
1 1 00 h. CMOA6 90	600	
Overall Comments:_Selected_VOC's_by_SW846-82	000	
Definition of Qualifiers:		
J- Estimated results		
U- Compound not detected		
R- Rejected data		
UJ- Estimated nondetecty // //		
Kalu V Silait		
Reviewer: // WWW Opposed 5		· · · · · · · · · · · · · · · · · · ·
Date:		

DATA REVIEW WORKSHEETS

DATA COMPLETENESS

MISSING INFORMATION	DATE LAB. CONTACTED	DATE RECEIVED
<u></u>		
The state of the s		
*		
<u> </u>		

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		\
		•
	A CALL AND	
		<u> </u>

All criteria were metX
Criteria were not met
and/or see below

HOLDING TIMES

The objective of this parameter is to ascertain the validity of the results based on the holding time of the sample from time of collection to the time of analysis.

Complete table for all samples and note the analysis and/or preservation not within criteria

SAMPLE ID	DATE SAMPLED	DATE ANALYZED	рН	ACTION				
		·						
All	All samples analyzed within the recommended method holding time							
		,						

Criteria

Aqueous samples – 14 days from sample collection for preserved samples (pH \leq 2, 4°C), no air bubbles.

Aqueous samples – 7 days from sample collection for unpreserved samples, 4°C, no air bubbles.

Soil samples- 14 days from sample collection.

Cooler temperature (Criteria: 4 + 2 °C): 3.4 °C - OK

Actions

If the VOCs vial(s) have air bubbles, estimate positive results (J) and reject nondetects (R).

If the % solids of soil samples is 10-50%, estimates positive results (J) and nondetects (UJ)

If the % solid of soil samples is < 10%, estimate positive results (J) and reject nondetects (R).

If holding times are exceeded but < 14 days beyond criteria, estimate positive results (J) and nondetects (UJ).

If holding times are exceeded but < 28 days beyond criteria, estimate positive results (J) and reject nondetects (R).

If holding times are grossly exceeded (> 28 days beyond criteria), reject all results (R).

If samples were not iced or if the ice were melted (> 10°C), estimate positive results (J) and nondetects (UJ).

DATA REVIEW WORKSHEETS

		Criteria	were not met see below
GC/MS TUNING			
The assessment o standard tuning QO		o determine if the sample instrume	entation is within the
_XThe BFB p	erformance results were	reviewed and found to be within the	e specified criteria.
_XBFB tuning	g was performed for ever	y 12 hours of sample analysis.	
f no, use professi qualified or rejecte		nine whether the associated data	should be accepted,
ist	the	samples	affected:

If mass calibration is in error, all associated data are rejected.

All criteria were metX
Criteria were not met
and/or see below

CALIBRATION VERIFICATION

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing and maintaining acceptable quantitative data.

	Dat	e of initi	al calibr	ation:	07/24/15		
	Dat	es of co	ntinuing	calibration:_09/10/15;_	5;_09/11/15;_09/12/15;_09/14/15;_09/15/15;_		
				_09/16/15;_0)9/17/15		
	Inst	rument	ID numb	oers:	GCM2B		
	Mat	rix/Leve	el:		Aqueous/low		
DATE		LAB ID#	FILE	CRITERIA OUT RFs, %RSD, %D, r	COMPOUND	SAMPLES AFFECTED	
· · · · · · · · · · · · · · · · · · ·							
		1 ***					
		Initia	al and co	ontinuing calibration me	ets method performan	ice criteria.	

Criteria

All RFs must be > 0.05 regardless of method requirements for SPCC.

All %RSD must be < 15 % regardless of method requirements for CCC.

All %Ds must be < 20% regardless of method requirements for CCC.

It should be noted that Region 2 SOP HW-24 does not specify criterion for the curve correlation coefficient (r). A limit for r of \geq 0.995 has therefore been utilized as professional judgment.

Actions

If any compound has an initial RF or a continuing RF of < 0.05, estimate positive results (J) and reject nondetects (R), regardless of method requirements.

If any compound has a %RSD > 15%, estimate positive results (J) and use professional judgment to qualify nondetects.

If any compound has a %RSD > 90%, estimate positive results (J) and reject nondetects (R).

If any compound has a % D > 20%, estimate positive results (J) and reject nondetects (R).

If any compound has a % D > 20%, estimate positive results (J) and nondetects (UJ).

If any compound has a % D > 90%, estimate positive results (J) and reject nondetects (R).

If any compound has r < 0.995, estimate positive results and nondetects.

DATA REVIEW WORKSHEETS

Laboratory blanks

A separate worksheet should be filled for each initial curve

All criteria were metX	
Criteria were not met	
and/or see below	

V A. BLANK ANALYSIS RESULTS (Sections 1 & 2)

The assessment of the blank analysis results is to determine the existence and magnitude of contamination problems. The criteria for evaluation of blanks apply only to blanks associated with the samples, including trip, equipment, and laboratory blanks. If problems with any blanks exist, all data associated with the case must be carefully evaluated to determine whether or not there is an inherent variability in the data for the case, or if the problem is an isolated occurrence not affecting other data.

List the contamination in the blanks below. High and low levels blanks must be treated separately.

DATE ANALYZED	LAB ID	LEVEL/ MATRIX	COMPOUND	CONCENTRATION UNITS
All_method	l_blank_meeth_		fic_criteria	
Field/ <u>Equipmen</u>	t/Trip blank			
DATE ANALYZED	LAB ID	LEVEL/ MATRIX	COMPOUND	CONCENTRATION UNITS
				ed_as_part_of_this_data

All criteria were met	X
Criteria were not met	
and/or see below	

VB. BLANK ANALYSIS RESULTS (Section 3)

Blank Actions

Action Levels (ALs) should be based upon the highest concentration of contaminant determined in any blank. Do not qualify any blank with another blank. The ALs for samples which have been diluted should be corrected for the sample dilution factor and/or % moisture, where applicable. No positive sample results should be reported unless the concentration of the compound in the samples exceeds the ALs:

ALs = 10x the amount of common contaminants (methylene chloride, acetone, 2-butanone, and toluene)

ALs = 5x for any other compounds

Specific actions are as follows:

If the concentration is < sample quantitation limit (SQL) and \le AL, report the compound as not detected (U) at the SQL.

If the concentration is \geq SQL but \leq AL, report the compound as not detected (U) at the reported concentration.

If the concentration is \geq SQL and > AL, report the concentration unqualified.

Notes:

High and low level blanks must be treated separately

Compounds qualified "U" for blank contamination are still considered "hits" when qualifying for calibration criteria.

CONTAMINATION SOURCE/LEVEL	COMPOUND	CONC/UNITS	AL/UNITS	SQL	AFFECTED SAMPLES
					w

All criteria were metX_	
Criteria were not met	
and/or see below	

SURROGATE SPIKE RECOVERIES

Laboratory performance of individual samples is established by evaluation of surrogate spike recoveries. All samples are spiked with surrogate compounds prior to sample analysis. The accuracy of the analysis is measured by the surrogate percent recovery. Since the effects of the sample matrix are frequently outside the control of the laboratory and may present relatively unique problems, the validation of data is frequently subjective and demands analytical experience and professional judgment.

List the percent recoveries (%Rs) which do not meet the criteria for surrogate recovery.

Matrix: solid/aqueous

SAMPLE ID		ACTION			
	1,2-DCA	DBFM	TOL-d8	BFB	
_All_surrogate_reco	veries_withir	n_laboratory_c	ontrol_limits		

			· · · · · · · · · · · · · · · · · · ·		
QC Limits* (Aqueou					
LL_to_UL	to_	to_	to	to	
QC Limits* (Solid-Lo					
LL_to_UL		to_	to	to	
QC Limits* (Solid-Me	ed)				
LL_to_UL	to	to_	to	to	nanaga yan
1,2-DCA = 1,2-Dichl	oromethane-	d4	TOL-da	3 = Toluene-d8	
DBFM = Dibromoflu			Bromofluorober	zene	

- QC limits are laboratory in-house performance criteria, LL = lower limit, UL = upper limit.
- * If QC limits are not available, use limits of 80 120 % for aqueous and 70 130 % for solid samples.

Actions:

QUALITY	%R < 10%	%R = 10% - LL	%R > UL
Positive results	J	J	J
Nondetects results	R	UJ	Accept

Surrogate action should be applied:

If one or more surrogate in the VOC fraction is out of specification, but has a recovery of > 10%. If any one surrogate in a fraction shows < 10 % recovery.

All criteria were met
Criteria were not met
and/or see belowX

VII. A MATRIX SPIKE/MATRIX SPIKE DUPLICATE (MS/MSD)

This data is generated to determine long term precision and accuracy in the analytical method for various matrices. This data alone cannot be used to evaluate the precision and accuracy of individual samples. If any % R in the MS or MSD falls outside the designated range, the reviewer should determine if there are matrix effects, i.e. LCS data are within the QC limits but MS/MSD data are outside QC limit.

1. MS/MSD Recoveries and Precision Criteria

The laboratory should use one MS and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If target analytes are not expected, MS/MSD should be analyzed.

List the %Rs, RPD of the compounds which do not meet the criteria.

Sample ID:JC3254-25MS/-25MSD	Matrix/Level:GROUNDWATER
Sample ID:JC3254-16MS/-16MSD	Matrix/Level:GROUNDWATER
Sample ID:JC3254-20MS/-20MSD	Matrix/Level:GROUNDWATER
Sample ID:JB3254-6MS	Matrix/Level:GROUNDWATER
Sample ID:JB3137-3MS/-3MSD	Matrix/Level:GROUNDWATER
MS OR MSD COMPOUND %	R RPD QC LIMITS ACTION
_MS/MSD-recoveries_and_RPD_within_lab	oratory_control_limits_except_for_the_following:
JC3254-25MS/-25MSD	
_MS/MSDETHYLBENZENE3	2/-3838139No_action

^{*} QC limits are laboratory in-house performance criteria, LL = lower limit, UL = upper limit.

Actions:

QUALITY	%R < LL	%R > UL
Positive results	J	J
Nondetects results	R	Accept

MS/MSD criteria apply only to the unspiked sample, its dilutions, and the associated MS/MSD samples:

If the % R for the affected compounds were < LL (or 70 %), qualify positive results (J) and nondetects (UJ).

If the % R for the affected compounds were > UL (or 130 %), only qualify positive results (J).

If 25 % or more of all MS/MSD %R were < LL (or 70 %) or if two or more MS/MSD %Rs were < 10%, qualify all positive results (J) and reject nondetects (R).

A separate worksheet should be used for each MS/MSD pair.

^{*} If QC limits are not available, use limits of 70 – 130 %.

All criteria were met
Criteria were not met
and/or see belowX

VII. A MATRIX SPIKE/MATRIX SPIKE DUPLICATE (MS/MSD)

This data is generated to determine long term precision and accuracy in the analytical method for various matrices. This data alone cannot be used to evaluate the precision and accuracy of individual samples. If any % R in the MS or MSD falls outside the designated range, the reviewer should determine if there are matrix effects, i.e. LCS data are within the QC limits but MS/MSD data are outside QC limit.

1. MS/MSD Recoveries and Precision Criteria

The laboratory should use one MS and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If target analytes are not expected, MS/MSD should be analyzed.

List the %Rs, RPD of the compounds which do not meet the criteria.

Sample ID:JC3538-8MS/-8MSD Sample ID:JC3669-14MS/-14MSD Sample ID:JB3795-7MS/-7MSD		Matrix/Level:GROUNDWATER Matrix/Level:GROUNDWATER Matrix/Level:GROUNDWATER			
MS OR MSD COMPOUND % R _MS/MSD-recoveries_and_RPD_within_laborate			QC LIMITS	ACTION r the following:	
JC3795-7MS/-7MS _MS/MSD	SD	62/-56	-	_43138	_No_action

- * QC limits are laboratory in-house performance criteria, LL = lower limit, UL = upper limit.
- * If QC limits are not available, use limits of 70 130 %.

Actions:

QUALITY	%R < LL	%R > UL
Positive results	J	J
Nondetects results	R	Accept

MS/MSD criteria apply only to the unspiked sample, its dilutions, and the associated MS/MSD samples:

If the % R for the affected compounds were < LL (or 70 %), qualify positive results (J) and nondetects (UJ).

If the % R for the affected compounds were > UL (or 130 %), only qualify positive results (J).

If 25 % or more of all MS/MSD %R were < LL (or 70 %) or if two or more MS/MSD %Rs were < 10%, qualify all positive results (J) and reject nondetects (R).

A separate worksheet should be used for each MS/MSD pair.

All criteria were metX_	
Criteria were not met	
and/or see below	

VII. B MATRIX SPIKE/MATRIX SPIKE DUPLICATE

MS/MSD - Unspiked Compounds

It should be noted that Region 2 SOP HW-24 does not specify a MS/MSD criteria for the unspiked compounds in the sample. A %RSD of < 50% has therefore been utilized as professional judgment.

If all target analytes were spiked in the MS/MSD, this review element is not applicable.

List the %RSD of the compounds which do not meet the criteria.

Sample ID:		Matrix/Level/Unit:			
COMPOUND	SAMPLE CONC.	MS CONC.	MSD CONC.	% RSD	ACTION

Actions:

^{*} If the % RSD > 50, qualify the positive result in the unspiked samples as estimated (J).

^{*} If the % RSD is not calculated (NC) due to nondetected value, use professional judgment to qualify the data.

All criteria were metX
Criteria were not met
and/or see below

VIII. LABORATORY CONTROL SAMPLE (LCS) ANALYSIS

This data is generated to determine accuracy of the analytical method for various matrices.

1. LCS Recoveries Criteria

Where LCS spiked with the same analyte at the same concentrations as the MS/MSD? Yes or No. If no make note in data review memo.

List the %R of compounds which do not meet the criteria

	LCS ID	COMPOUND	% R	QC LIMH		
Recoverie	Recoveries_(blank_spike)_within_laboratory_control_limits					

- * QC limits are laboratory in-house performance criteria, LL = lower limit, UL = upper limit.
- * If QC limits are not available, use limits of 70 130 %.

Actions:

QUALITY	%R < LL	%R > UL
Positive results	J	J
Nondetects results	R	Accept

All analytes in the associated sample results are qualified for the following criteria.

If 25 % of the LCS recoveries were < LL (or 70 %), qualify all positive results (j) and reject nondetects (R).

If two or more LCS were below 10 %, qualify all positive results as (J) and reject nondetects (R).

2. Frequency Criteria:

Where LCS analyzed at the required frequency and for each matrix? <u>Yes</u> or No. If no, the data may be affected. Use professional judgment to determine the severity of the effect and qualify data accordingly. Discuss any actions below and list the samples affected.

			All criteria were metX Criteria were not met and/or see below
IX.	FIELD DUPLICATE PR		
	Sample IDs:JC3	3254-6/JC3254-7	Matrix:_Groundwater
	Sample IDs:JC3	3254-13/JC3254-14	Matrix:_Groundwater_
	Sample IDs:JC3	3254-17/JC3254-18	Matrix:_Groundwater

Field duplicates samples may be taken and analyzed as an indication of overall precision. These analyses measure both field and lab precision; therefore, the results may have more variability than laboratory duplicates which only laboratory performance. It is also expected that soil duplicate results will have a greater variance than water matrices due to difficulties associated with collecting identical field duplicate samples.

The project QAPP should be reviewed for project-specific information. Suggested criteria: RPD \pm 30% for aqueous samples, RPD \pm 50 % for solid samples. If both samples and duplicate are <5 SQL, the RPD criteria is doubled.

COMPOUND	SQL	SAMPLE CONC.	DUPLICATE CONC.	RPD	ACTION
	<u> </u>				
	ļ				
				<u> </u>	<u> </u>
	RPD	within laboratory a	nd generally acceptable	control li	mits.
	ļ				
	ļ			<u> </u>	

Actions:

Qualify as estimated positive results (J) and nondetects (UJ) for the compound that exceeded the above criteria. For organics, only the sample and duplicate will be qualified.

If an RPD cannot be calculated because one or both of the sample results is not detected, the following actions apply:

If one sample result is not detected and the other is greater than 5x the SQL qualify (J/UJ).

If one sample value is not detected and the other is greater than 5x the SQL and the SQLs for the sample and duplicate are significantly different, use professional judgment to determine if qualification is appropriate.

If one sample value is not detected and the other is less than 5x, use professional judgment to determine if qualification is appropriate.

If both sample and duplicate results are not detected, no action is needed.

		All criteria were metX Criteria were not met and/or see below
X.	LABORATORY DUPLICATE PRECISION	
	Sample IDs:JC3254-7	Matrix:_Groundwater

Field/laboratory duplicates samples may be taken and analyzed as an indication of overall precision. These analyses measure both field and lab precision; therefore, the results may have more variability than laboratory duplicates which only laboratory performance. It is also expected that soil duplicate results will have a greater variance than water matrices due to difficulties associated with collecting identical field duplicate samples.

The project QAPP should be reviewed for project-specific information. Suggested criteria: RPD \pm 30% for aqueous samples, RPD \pm 50 % for solid samples. If both samples and duplicate are <5 SQL, the RPD criteria is doubled.

COMPOUND	SQL	SAMPLE CONC.	DUPLICATE CONC.	RPD	ACTION
			- William Market Ball profession for a construction of		
	RPD) within laboratory ar	l nd generally acceptable	control li	mits.
			MIN 40 M (4 M		

Actions:

Qualify as estimated positive results (J) and nondetects (UJ) for the compound that exceeded the above criteria. For organics, only the sample and duplicate will be qualified.

If an RPD cannot be calculated because one or both of the sample results is not detected, the following actions apply:

If one sample result is not detected and the other is greater than 5x the SQL qualify (J/UJ).

If one sample value is not detected and the other is greater than 5x the SQL and the SQLs for the sample and duplicate are significantly different, use professional judgment to determine if qualification is appropriate.

If one sample value is not detected and the other is less than 5x, use professional judgment to determine if qualification is appropriate.

If both sample and duplicate results are not detected, no action is needed.

All criteria were metX
Criteria were not met
and/or see below

X. INTERNAL STANDARD PERFORMANCE

The assessment of the internal standard (IS) parameter is used to assist the data reviewer in determining the condition of the analytical instrumentation.

List the internal standard area of samples which do not meet the criteria.

- * Area of +100% or -50% of the IS area in the associated calibration standard.
- * Retention time (RT) within 30 seconds of the IS area in the associated calibration standard.

DAIE	SAMPLE ID	IS 001	IS AREA	ACCEPTABLE RANGE	ACTION
_Internal_sta	andard_area_within_	_laboratory_coi	ntrol_limits		
				· · · · · · · · · · · · · · · · · · ·	
					*
Actions:					

1. IS actions should be applied to the compound quantitated with the out-of-control ISs

QUALITY	IS AREA < -25%	IS AREA = -25 % TO – 50%	IS AREA > + 100%
Positive results	J	J	J
Nondetected results	R	UJ	ACCEPT

2. If a IS retention time varies more than 30 seconds, the chromatographic profile for that sample must be examined to determine if any false positive or negative exists. For shifts of a large magnitude, the reviewer may consider partial or total rejection of the data for the sample fraction.

All criteria were metX	
Criteria were not met	
and/or see below	

XII. SAMPLE QUANTITATION

The sample quantitation evaluation is to verify laboratory quantitation results. In the space below, please show a minimum of one sample calculation:

JC3254-3

Ethylbenzene

RF = 1.197

[] = (30379)(50)/(365642)(1.197)

= 3.47 ppb OK

All criteria were metX
Criteria were not met
and/or see below

XII. QUANTITATION LIMITS

A. Dilution performed

SAMPLE ID	DILUTION FACTOR	REASON FOR DILUTION
JC3254-9	100 X; 1000 X	Analytes outside calibration range
JC3254-20	25 X	Analytes outside calibration range
JC3254-25	200 X	Ethylbenzene outside calibration range
JC3254-28	200 X	Analytes outside calibration range

B.	Percent Solids
	List samples which have ≤ 50 % solids

Actions:

If the % solids of a soil sample is 10-50%, estimate positive results (J) and nondetects (UJ) If the % solids of a soil sample is < 10%, estimate positive results (J) and reject nondetects (R)

	F10]ect NumberJC3234
	Date:09/03-09/2015
REVIEW OF VOLATILE ORGOTHE The following guidelines for evaluating volatile organics was actions. This document will assist the reviewer in using production and in better serving the needs of the data users. The USEPA data validation guidance documents in the following HW-24, Standard Operating Procedure for the Validation of 8260B (August, 2009-Revision 2), the USEPA Nation Concentration Organic Data Review (SOW SOM01.2 SOP H National Functional Guidelines for Organic Data Review for Le 2009-Revision 3). Also, QC criteria from "Test Methods for Methods SW-846 (Final Update III, December 1996)," specific QC criteria and data validation actions listed on the data review.	Date:09/03-09/2015 ANIC PACKAGE were created to delineate required validation rofessional judgment to make more informed the sample results were assessed according to order of precedence: USEPA Region 2, SOP Organic Data Acquired using SW-846 Method al Functional Guidelines for Low/Medium IW-33, August 2009 – Revision 2), the USEPA ow Concentration Water (SOP HW-13, August, or Evaluating Solid Waste, Physical/Chemical cally for Methods 8000/8260B are utilized. The
document, unless otherwise noted. The hardcopied (laboratory name) _Accutest	data nackage received has been
reviewed and the quality control and performance data summa	arized. The data review for VOCs included:
Lab. Project/SDG No.:JC3254 No. of Samples:18	Sample matrix:Groundwater
Trip blank No.:	
X Data CompletenessX Holding TimesN/A_ GC/MS TuningN/A_ Internal Standard PerformanceX BlanksX Surrogate RecoveriesX Matrix Spike/Matrix Spike Duplicate	X Laboratory Control SpikesX Field DuplicatesX CalibrationsX Compound IdentificationsX Compound QuantitationX Quantitation Limits
Overall Comments:_Selected_alcohols_(I 846_8015C_(DAI)	sopropyl_alcohol_and_Methanol)_by_SW-
Definition of Qualifiers: J- Estimated results U- Compound not detected R- Rejected data UJ- Estimated nondetect Reviewer: Date: 09/29/2015	

DATA COMPLETENESS

MISSING INFORMATION	DATE LAB. CONTACTED	DATE RECEIVED
	<u> </u>	

		\
		\
		<u> </u>
		N. T.

All criteria were metX
Criteria were not met
and/or see below

HOLDING TIMES

The objective of this parameter is to ascertain the validity of the results based on the holding time of the sample from time of collection to the time of analysis.

Complete table for all samples and note the analysis and/or preservation not within criteria

SAMPLE ID	DATE SAMPLED	DATE ANALYZED	pН	ACTION
Α	II samples analyzed w	rithin the recommended	method	holding time
L				

Criteria

Aqueous samples – 14 days from sample collection for preserved samples (pH \leq 2, 4°C), no air bubbles.

Aqueous samples – 7 days from sample collection for unpreserved samples, 4°C, no air bubbles. Soil samples- 7 days from sample collection.

Cooler temperature (Criteria: 4 + 2 °C): 4°C

Actions

If the VOCs vial(s) have air bubbles, estimate positive results (J) and reject nondetects (R). If the % solids of soil samples is 10-50%, estimates positive results (J) and nondetects (UJ) If the % solid of soil samples is < 10%, estimate positive results (J) and reject nondetects (R). If holding times are exceeded but < 14 days beyond criteria, estimate positive results (J) and nondetects (UJ).

If holding times are exceeded but < 28 days beyond criteria, estimate positive results (J) and reject nondetects (R).

If holding times are grossly exceeded (> 28 days beyond criteria), reject all results (R).

If samples were not iced or if the ice were melted (> 10°C), estimate positive results (J) and nondetects (UJ).

List	the	samples	affected:
If no, use profession qualified or rejected.	al judgment to dete	rmine whether the associated da	ta should be accepted,
N/A_ BFB tuning w	as performed for ev	ery 12 hours of sample analysis.	
N/A_ The BFB per	formance results we	re reviewed and found to be within	the specified criteria.
The assessment of t standard tuning QC li		to determine if the sample instru	mentation is within the
GC/MS TUNING			
		Cri	teria were not met see below
			Ali chieria were mei INA

If mass calibration is in error, all associated data are rejected.

All criteria were metX
Criteria were not met
and/or see below

CALIBRATION VERIFICATION

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing and maintaining acceptable quantitative data.

Date of initial calibration:	05/20/15
Dates of continuing calibration	:_09/14/15
Instrument ID number:	_GCGH
Matrix/Level:	Aqueous/low

DATE	LAB ID#	FILE	CRITERIA OUT RFs, %RSD, %D, r	COMPOUND	SAMPLES AFFECTED
		Initial an	d continuing calibration	meet method specific	criteria

Criteria

All RFs must be > 0.05 regardless of method requirements for SPCC.

All %RSD must be \leq 15 % regardless of method requirements for CCC.

All %Ds must be < 20% regardless of method requirements for CCC.

It should be noted that Region 2 SOP HW-24 does not specify criterion for the curve correlation coefficient (r). A limit for r of \geq 0.995 has therefore been utilized as professional judgment.

Actions

If any compound has an initial RF or a continuing RF of < 0.05, estimate positive results (J) and reject nondetects (R), regardless of method requirements.

If any compound has a %RSD > 15%, estimate positive results (J) and use professional judgment to qualify nondetects.

If any compound has a %RSD > 90%, estimate positive results (J) and reject nondetects (R).

If any compound has a % D > 20%, estimate positive results (J) and reject nondetects (R).

If any compound has a % D > 20%, estimate positive results (J) and nondetects (UJ).

If any compound has a % D > 90%, estimate positive results (J) and reject nondetects (R).

If any compound has r > 0.995, estimate positive results and nondetects.

A separate worksheet should be filled for each initial curve

All criteria were metX
Criteria were not met
and/or see below

V A. BLANK ANALYSIS RESULTS (Sections 1 & 2)

The assessment of the blank analysis results is to determine the existence and magnitude of contamination problems. The criteria for evaluation of blanks apply only to blanks associated with the samples, including trip, equipment, and laboratory blanks. If problems with any blanks exist, all data associated with the case must be carefully evaluated to determine whether or not there is an inherent variability in the data for the case, or if the problem is an isolated occurrence not affecting other data.

List the contamination in the blanks below. High and low levels blanks must be treated separately.

Laboratory blanks

DATE Analyzed	LAB ID	LEVEL/ MATRIX	COMPOUND	CONCENTRATION UNITS
All_method	***************************************	·	fic_criteria	
Field/ <u>Equipmen</u>				
DATE Analyzed	LAB ID	LEVEL/ MATRIX	COMPOUND	CONCENTRATION UNITS
			nent_blankNo_trip/fiel	

All criteria were metX
Criteria were not met
and/or see below

VB. BLANK ANALYSIS RESULTS (Section 3)

Blank Actions

Action Levels (ALs) should be based upon the highest concentration of contaminant determined in any blank. Do not qualify any blank with another blank. The ALs for samples which have been diluted should be corrected for the sample dilution factor and/or % moisture, where applicable. No positive sample results should be reported unless the concentration of the compound in the samples exceeds the ALs:

ALs = 10x the amount of common contaminants (methylene chloride, acetone, 2-butanone, and toluene)

ALs = 5x for any other compounds

Specific actions are as follows:

If the concentration is < sample quantitation limit (SQL) and \le AL, report the compound as not detected (U) at the SQL.

If the concentration is \geq SQL but \leq AL, report the compound as not detected (U) at the reported concentration.

If the concentration is \geq SQL and > AL, report the concentration unqualified.

Notes:

High and low level blanks must be treated separately

Compounds qualified "U" for blank contamination are still considered "hits" when qualifying for calibration criteria.

CONTAMINATION SOURCE/LEVEL	COMPOUND	CONC/UNITS	AL/UNITS	SQL	AFFECTED SAMPLES
					200
					and the second second

All criteria were metX
Criteria were not met
and/or see below

SURROGATE SPIKE RECOVERIES

Laboratory performance of individual samples is established by evaluation of surrogate spike recoveries. All samples are spiked with surrogate compounds prior to sample analysis. The accuracy of the analysis is measured by the surrogate percent recovery. Since the effects of the sample matrix are frequently outside the control of the laboratory and may present relatively unique problems, the validation of data is frequently subjective and demands analytical experience and professional judgment.

List the percent recoveries (%Rs) which do not meet the criteria for surrogate recovery. Matrix: solid/aqueous

SAMPLE ID		SURROGATE COMPOUND			ACTION	
He	xanol	DBFM	TOL-d8	BFB		
_All_surrogate_recover	ries_within_la	boratory_cor	ntrol_limits			
QC Limits* (Aqueous)						
LL_to_UL	48 to 150	to	to	to		
QC Limits* (Solid-Low)					-	
LL_to_UL´	to	to	to	to	_	
QC Limits* (Solid-Med)					_	
LL_to_UL	to	to	to	to	-	
1,2-DCA = 1,2-Dichloro	methane-d4		TOL-d8	= Toluene-d8		
DBFM = Dibromofluoro	methane		BFB = B	romofluorobenze	ne	

Actions:

QUALITY	%R < 10%	%R = 10% - LL	%R > UL
Positive results	J	J	J
Nondetects results	R	UJ	Accept

Surrogate action should be applied:

If one or more surrogate in the VOC fraction is out of specification, but has a recovery of > 10%. If any one surrogate in a fraction shows < 10 % recovery.

^{*} QC limits are laboratory in-house performance criteria, LL = lower limit, UL = upper limit.

^{*} If QC limits are not available, use limits of 80 - 120 % for aqueous and 70 - 130 % for solid samples.

All criteria were met _X
Criteria were not met
and/or see below

VII. A MATRIX SPIKE/MATRIX SPIKE DUPLICATE (MS/MSD)

This data is generated to determine long term precision and accuracy in the analytical method for various matrices. This data alone cannot be used to evaluate the precision and accuracy of individual samples. If any % R in the MS or MSD falls outside the designated range, the reviewer should determine if there are matrix effects, i.e. LCS data are within the QC limits but MS/MSD data are outside QC limit.

1. MS/MSD Recoveries and Precision Criteria

The laboratory should use one MS and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If target analytes are not expected, MS/MSD should be analyzed.

List the %Rs, RPD of the compounds which do not meet the criteria.

Sample ID:JC3254-25MS/25MSD			Matrix/Level:Groundwater			
MS OR MSD	COMPOUND	% R	RPD	QC LIMITS	ACTION	

Note: MS/MSD recoveries and RPD within laboratory control limits.

- * QC limits are laboratory in-house performance criteria, LL = lower limit, UL = upper limit.
- * If QC limits are not available, use limits of 70 130 %.

Actions:

QUALITY	%R < LL	%R > UL
Positive results	J	J
Nondetects results	R	Accept

MS/MSD criteria apply only to the unspiked sample, its dilutions, and the associated MS/MSD samples:

If the % R for the affected compounds were < LL (or 70 %), qualify positive results (J) and nondetects (UJ).

If the % R for the affected compounds were > UL (or 130 %), only qualify positive results (J).

If 25 % or more of all MS/MSD %R were < LL (or 70 %) or if two or more MS/MSD %Rs were < 10%, qualify all positive results (J) and reject nondetects (R).

A separate worksheet should be used for each MS/MSD pair.

All criteria were metX
Criteria were not met
and/or see below

VII. B MATRIX SPIKE/MATRIX SPIKE DUPLICATE

MS/MSD – Unspiked Compounds

It should be noted that Region 2 SOP HW-24 does not specify a MS/MSD criteria for the unspiked compounds in the sample. A %RSD of < 50% has therefore been utilized as professional judgment.

If all target analytes were spiked in the MS/MSD, this review element is not applicable.

List the %RSD of the compounds which do not meet the criteria.

Sample ID:			Matrix/Level/Unit:			
COMPOUND	SAMPLE CONC.	MS CONC.	MSD CONC.	% RSD	ACTION	

Actions:

^{*} If the % RSD > 50, qualify the positive result in the unspiked samples as estimated (J).

^{*} If the % RSD is not calculated (NC) due to nondetected value, use professional judgment to qualify the data.

All criteria were metX
Criteria were not met
and/or see below

VIII. LABORATORY CONTROL SAMPLE (LCS) ANALYSIS

This data is generated to determine accuracy of the analytical method for various matrices.

1. LCS Recoveries Criteria

Where LCS spiked with the same analyte at the same concentrations as the MS/MSD? Yes or No. If no make note in data review memo.

List the %R of compounds which do not meet the criteria

	LCS ID	COMPOUND	% R	QC LIMIT		
Recoveries_within_laboratory_control_limits						

- * QC limits are laboratory in-house performance criteria, LL = lower limit, UL = upper limit.
- * If QC limits are not available, use limits of 70 130 %.

Actions:

QUALITY	%R < LL	%R > UL
Positive results	J	J
Nondetects results	R	Accept

All analytes in the associated sample results are qualified for the following criteria.

If 25 % of the LCS recoveries were < LL (or 70 %), qualify all positive results (j) and reject nondetects (R).

If two or more LCS were below 10 %, qualify all positive results as (J) and reject nondetects (R).

2. Frequency Criteria:

Where LCS analyzed at the required frequency and for each matrix? <u>Yes</u> or No. If no, the data may be affected. Use professional judgment to determine the severity of the effect and qualify data accordingly. Discuss any actions below and list the samples affected.

		All criteria were metX Criteria were not met and/or see below
FIELD/LABOR	RATORY DUPLICATE PRECISION	
Sample IDs:	_JC3254-6/JC3254-7	Matrix:Groundwater

Field/laboratory duplicates samples may be taken and analyzed as an indication of overall precision. These analyses measure both field and lab precision; therefore, the results may have more variability than laboratory duplicates which only laboratory performance. It is also expected that soil duplicate results will have a greater variance than water matrices due to difficulties associated with collecting identical field duplicate samples.

The project QAPP should be reviewed for project-specific information. Suggested criteria: RPD + 30% for aqueous samples, RPD + 50 % for solid samples. If both samples and duplicate are <5 SQL, the RPD criteria is doubled.

COMPOUND	SQL	SAMPLE CONC.	DUPLICATE CONC.	RPD	ACTION		
· · · · · · · · · · · · · · · · · · ·	RPD	 within laboratory ar	 nd generally acceptable	control	 imits.		
generally adoptable on a minute.							

Actions:

IX.

Qualify as estimated positive results (J) and nondetects (UJ) for the compound that exceeded the above criteria. For organics, only the sample and duplicate will be qualified.

If an RPD cannot be calculated because one or both of the sample results is not detected, the following actions apply:

If one sample result is not detected and the other is greater than 5x the SQL qualify (J/UJ).

If one sample value is not detected and the other is greater than 5x the SQL and the SQLs for the sample and duplicate are significantly different, use professional judgment to determine if qualification is appropriate.

If one sample value is not detected and the other is less than 5x, use professional judgment to determine if qualification is appropriate.

If both sample and duplicate results are not detected, no action is needed.

All criteria were met _	_N/A
Criteria were not met	
and/or see below	_

X. INTERNAL STANDARD PERFORMANCE

The assessment of the internal standard (IS) parameter is used to assist the data reviewer in determining the condition of the analytical instrumentation.

List the internal standard area of samples which do not meet the criteria.

- * Area of +100% or -50% of the IS area in the associated calibration standard.
- * Retention time (RT) within 30 seconds of the IS area in the associated calibration standard.

DATE	SAMPLE ID	IS OUT	IS AREA	ACCEPTABLE ACTION RANGE
			1.71	
		,		
				Marie and the second se

Actions:

1. IS actions should be applied to the compound quantitated with the out-of-control ISs

QUALITY	IS AREA < -25%	IS AREA = -25 % TO - 50%	IS AREA > + 100%
Positive results	J	J	J
Nondetected results	R	UJ	ACCEPT

If a IS retention time varies more than 30 seconds, the chromatographic profile for that sample must be examined to determine if any false positive or negative exists. For shifts of a large magnitude, the reviewer may consider partial or total rejection of the data for the sample fraction.

All criteria were metX
Criteria were not met
and/or see below

XII. SAMPLE QUANTITATION

The sample quantitation evaluation is to verify laboratory quantitation results. In the space below, please show a minimum of one sample calculation:

Blank Spike

Methanol

RF = 14.57

[] = (86071)/(14.87)

= 5907 ppb OK

Project Number:JC3254 Date:09/03-09/2015
ORGANIC PACKAGE
le organics were created to delineate assist the reviewer in using professional in better serving the needs of the data ding to USEPA data validation guidance ence Data Validation Standard Operating entration Semivolatile Acquired using SW-846 at 2009 –Revision 1); Validating Semivolatile PHW-22, August, 2009 – Revision 4) (noted also, QC criteria from "Test Methods for Methods SW-846 (Final Update IV, 20/8270D are utilized. The QC criteria review worksheets are from the primary
data package received has been reviewed The data review for VOCs included:
Sample matrix:Groundwater
X Laboratory Control SpikesX Field DuplicatesX CalibrationsX Compound IdentificationsX Compound QuantitationX Quantitation Limits

REVIEW OF SEMIVOLATILE

The following guidelines for evaluating volatil required validation actions. This document will a judgment to make more informed decision and users. The sample results were assessed accord documents in the following order of precede Procedure for Organic Analysis of Low/Medium Conce Method 8270C (SOW SOM01.2- SOP HW-35, Augus Organic Compounds by GC/MS, SW846 8270D (SOF herein as the "primary guidance document"), A Evaluating Solid Waste, Physical/Chemical December 1998)," specifically for Methods 800 and data validation actions listed on the data re guidance document, unless otherwise noted. The hardcopied (laboratory name) Accutest and the quality control and performance data summarized. Lab. Project/SDG No.: __JC3254____ No. of Samples: _____3___ Trip blank No.: ___-Field blank No.: ___-Equipment blank No.:__JC3254-30_ Field duplicate No.: JC3254-17/JC3254-18 X___ Data Completeness _X___ Holding Times X___ GC/MS Tuning X Internal Standard Performance X Blanks _X__ Surrogate Recoveries X___ Matrix Spike/Matrix Spike Duplicate Overall Comments: SVOCs (PAHs) SW856-8270D SIM **Definition of Qualifiers:** J-Estimated results U-Compound not detected R-Rejected data UJ-Estimated nondetext Reviewer: Date: 09/30/2015

1

DATA COMPLETENESS

MISSING INFORMATION	DATE LAB. CONTACTED	DATE RECEIVED
<u> </u>		
		The state of the s
		X .
		<u> </u>
		<u> </u>

All criteria were met
Criteria were not met
and/or see belowX

HOLDING TIMES

The objective of this parameter is to ascertain the validity of the results based on the holding time of the sample from time of collection to the time of analysis.

Complete table for all samples and note the analysis and/or preservation not within criteria

SAMPLE ID	DATE SAMPLED	DATE ANALYZED	pН	ACTION
All samples ex	xtracted and analyzed w	ithin the recommended following	d method	holding time except for the
JC3254-30	09/09/2015	09/17/2015	-	Results qualified as estimated (J).

Criteria

Soil samples – 14 days from sample collection for preserved samples (pH \leq 2, 4°C), no air bubbles.

Soil samples – 7 days from sample collection for unpreserved samples, 4°C, no air bubbles.

Aqueous samples- 7 days from sample collection.

Cooler temperature (Criteria: 4 + 2 °C): 2.3 °C - OK

Actions

If the VOCs vial(s) have air bubbles, estimate positive results (J) and reject nondetects (R).

If the % solids of soil samples is 10-50%, estimates positive results (J) and nondetects (UJ)

If the % solid of soil samples is < 10%, estimate positive results (J) and reject nondetects (R).

If holding times are exceeded but < 14 days beyond criteria, estimate positive results (J) and nondetects (UJ).

If holding times are exceeded but < 28 days beyond criteria, estimate positive results (J) and reject nondetects (R).

If holding times are grossly exceeded (> 28 days beyond criteria), reject all results (R).

If samples were not iced or if the ice were melted (> 10°C), estimate positive results (J) and nondetects (UJ).

		Criteria v	All criteria were metX vere not met see below
GC/MS TUNING	i		
The assessment standard tuning (determine if the sample instrume	ntation is within the
X The DF criteria.	TPP performance results we	ere reviewed and found to be	within the specified
X DFTPP t	tuning was performed for eve	ry 12 hours of sample analysis.	
If no, use profes qualified or rejec		ne whether the associated data s	hould be accepted,
List	the	samples	affected:

If mass calibration is in error, all associated data are rejected. $% \label{eq:calibration} %

All criteria were met	X
Criteria were not met	
and/or see below	

CALIBRATION VERIFICATION

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing and maintaining acceptable quantitative data.

Date of initial calibration:	_09/04/15
Dates of continuing calibration:_	_09/17/15
Instrument ID numbers:GCM	IS3M
Matrix/Level:_Aqueous/low	

DATE	LAB ID#	FILE	CRITERIA OUT RFs, %RSD, %D, r	COMPOUND	SAMPLES AFFECTED
Initi	al and	continui	ng calibration meet m	ethod specific requirements fo	or target analytes

Criteria

All RFs must be > 0.05 regardless of method requirements for SPCC.

All %RSD must be < 15 % regardless of method requirements for CCC.

All %Ds must be < 20% regardless of method requirements for CCC.

It should be noted that Region 2 SOP HW-24 does not specify criterion for the curve correlation coefficient (r). A limit for r of \geq 0.995 has therefore been utilized as professional judgment.

Actions

If any compound has an initial RF or a continuing RF of < 0.05, estimate positive results (J) and reject nondetects (R), regardless of method requirements.

If any compound has a %RSD > 15%, estimate positive results (J) and use professional judgment to qualify nondetects.

If any compound has a %RSD > 90%, estimate positive results (J) and reject nondetects (R).

If any compound has a % D > 20%, estimate positive results (J) and reject nondetects (R).

If any compound has a % D > 20%, estimate positive results (J) and nondetects (UJ).

If any compound has a % D > 90%, estimate positive results (J) and reject nondetects (R).

If any compound has r > 0.995, estimate positive results and nondetects.

A separate worksheet should be filled for each initial curve

All criteria were metX
Criteria were not met
and/or see below

CALIBRATION VERIFICATION

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing and maintaining acceptable quantitative data.

Date of initial calibration:	_09/10/15
Dates of continuing calibration:	_09/17/15;09/24/15
Instrument ID numbers:	_GCMS4M
Matrix/Level:	_Aqueous/low

DATE	LAB ID#	FILE	CRITERIA OUT RFs, %RSD, %D, r	COMPOUND	SAMPLES AFFECTED
Initi	al and	continui	ng calibration meet m	ethod specific requirements for	target analytes

Criteria

All RFs must be > 0.05 regardless of method requirements for SPCC.

All %RSD must be < 15 % regardless of method requirements for CCC.

All %Ds must be < 20% regardless of method requirements for CCC.

It should be noted that Region 2 SOP HW-24 does not specify criterion for the curve correlation coefficient (r). A limit for r of \geq 0.995 has therefore been utilized as professional judgment.

Actions

If any compound has an initial RF or a continuing RF of < 0.05, estimate positive results (J) and reject nondetects (R), regardless of method requirements.

If any compound has a %RSD > 15%, estimate positive results (J) and use professional judgment to qualify nondetects.

If any compound has a %RSD > 90%, estimate positive results (J) and reject nondetects (R).

If any compound has a % D > 20%, estimate positive results (J) and reject nondetects (R).

If any compound has a % D > 20%, estimate positive results (J) and nondetects (UJ).

If any compound has a % D > 90%, estimate positive results (J) and reject nondetects (R).

If any compound has r > 0.995, estimate positive results and nondetects.

A separate worksheet should be filled for each initial curve

All criteria were metX
Criteria were not met
and/or see below

V A. BLANK ANALYSIS RESULTS (Sections 1 & 2)

The assessment of the blank analysis results is to determine the existence and magnitude of contamination problems. The criteria for evaluation of blanks apply only to blanks associated with the samples, including trip, equipment, and laboratory blanks. If problems with any blanks exist, all data associated with the case must be carefully evaluated to determine whether or not there is an inherent variability in the data for the case, or if the problem is an isolated occurrence not affecting other data.

List the contamination in the blanks below. High and low levels blanks must be treated separately.

Laboratory blanks

DATE ANALYZED	LAB ID	LEVEL/ MATRIX	COMPOUND	CONCENTRATION UNITS
Field/ <u>Equipment</u>				
DATE ANALYZED	LAB ID	LEVEL/ MATRIX	COMPOUND	CONCENTRATION UNITS
	s_not_detected	d_above_report		ment_blank_analyzed_with_
<u> </u>				

All criteria were met
Criteria were not met
and/or see belowX

SURROGATE SPIKE RECOVERIES

Laboratory performance of individual samples is established by evaluation of surrogate spike recoveries. All samples are spiked with surrogate compounds prior to sample analysis. The accuracy of the analysis is measured by the surrogate percent recovery. Since the effects of the sample matrix are frequently outside the control of the laboratory and may present relatively unique problems, the validation of data is frequently subjective and demands analytical experience and professional judgment.

List the percent recoveries (%Rs) which do not meet the criteria for surrogate recovery.

Matrix: solid/Soil

SAMPLE ID	SURROGATE COMPOUND			ACTION
	S1	\$2	S3	
_Surrogate_recoveries_wi	thin_laboratory_con	trol_limits_except	_for_the_follo	wings
_JC3254-17	0			No_action
_JC3254-17	2			No_action
_JC3254-18	0			_No_action
_JC3254-18	2		·	No_action

Note: Outside control limits due to matrix interference. Confirmed by re-extraction.

QC Limits* (Aqueous)LL_to_UL	_18_to_128_	_13_to_124_	_10_to_127_	to
QC Limits* (Solid-Low)				
LL_to_UL	to	to	to	to
QC Limits* (Solid-Med)				
LL_to_UL ´	to	to	to	to
4				
S1 - Nitrohenzene-d	5			

- S2 -2-Fluorobiphenyl

S3 -Terphenyl-d14

- QC limits are laboratory in-house performance criteria, LL = lower limit, UL = upper limit.
- If QC limits are not available, use limits of 80 120 % for Agueous and 70 130 % for solid/soil samples.

Actions:

QUALITY	%R < 10%	%R = 10% - LL	%R > UL
Positive results	J	J	J
Nondetects results	R	UJ	Accept

Surrogate action should be applied:

If one or more surrogate in the SVOC fraction is out of specification, but has a recovery of > 10%. If any one surrogate in a fraction shows < 10 % recovery.

All criteria were met
Criteria were not met
and/or see belowX

VII. A MATRIX SPIKE/MATRIX SPIKE DUPLICATE (MS/MSD)

This data is generated to determine long term precision and accuracy in the analytical method for various matrices. This data alone cannot be used to evaluate the precision and accuracy of individual samples. If any % R in the MS or MSD falls outside the designated range, the reviewer should determine if there are matrix effects, i.e. LCS data are within the QC limits but MS/MSD data are outside QC limit.

1. MS/MSD Recoveries and Precision Criteria

The laboratory should use one MS and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If target analytes are not expected, MS/MSD should be analyzed.

List the %Rs, RPD of the compounds which do not meet the criteria.

Sample ID:JC: Sample ID:JC:	3769-2_MS/MSD_(8 3875-1_MS/MSD_(8	SVOCs) SVOCs)		Matri Matri	x/Level:Aqueous x/Level:Aqueous
MS OR MSD	COMPOUND	%R	RPD	QC LIMITS	ACTION
MS/MSD_and_R _JC-3769-2	PD_within_laborato	ry_control_li	mits_e	ccept_for_the_f	ollowing
MS/MSD	Anthracene	0%/0%		40152	Qualify_results_(J)
_MSD	Chrysene	26%	_	31 143	No_action
_MS/MSD	Fluoranthene	0%/0%		42 - 139	No_action*
_MS/MSD	Phenanthrene	0%/0%		38 - 146	No_action*
_MS/MSD	Pyrene	0%/0%		37148	No_action*

Note: *- Outside control limits due to high level in sample relative to spike amount.

- * QC limits are laboratory in-house performance criteria, LL = lower limit, UL = upper limit.
- * If QC limits are not available, use limits of 70 130 %.

Actions:

QUALITY	%R <ll< th=""><th>%R > UL</th></ll<>	%R > UL
Positive results	J	J
ondetects results	R	Accept

MS/MSD criteria apply only to the unspiked sample, its dilutions, and the associated MS/MSD samples:

If the % R for the affected compounds were < LL (or 70 %), qualify positive results (J) and nondetects (UJ).

If the % R for the affected compounds were > UL (or 130 %), only qualify positive results (J).

If 25 % or more of all MS/MSD %R were < LL (or 70 %) or if two or more MS/MSD %Rs were < 10%, qualify all positive results (J) and reject nondetects (R).

A separate worksheet should be used for each MS/MSD pair.

All criteria were metN/A	
Criteria were not met	
and/or see below	

VII. B MATRIX SPIKE/MATRIX SPIKE DUPLICATE

MS/MSD - Unspiked Compounds

It should be noted that Region 2 SOP HW-24 does not specify a MS/MSD criteria for the unspiked compounds in the sample. A %RSD of < 50% has therefore been utilized as professional judgment.

If all target analytes were spiked in the MS/MSD, this review element is not applicable.

List the %RSD of the compounds which do not meet the criteria.

Sample ID:	ample ID:			Matrix/Level/Unit:		
COMPOUND	SAMPLE CONC.	MS CONC.	MSD CONC.	% RSD	ACTION	
				www.thau.		
					,	

Actions:

^{*} If the % RSD > 50, qualify the positive result in the unspiked samples as estimated (J).

^{*} If the % RSD is not calculated (NC) due to nondetected value, use professional judgment to qualify the data.

All criteria were metX_	
Criteria were not met	
and/or see below	

VIII. LABORATORY CONTROL SAMPLE (LCS) ANALYSIS

This data is generated to determine accuracy of the analytical method for various matrices.

1. LCS Recoveries Criteria

Where LCS spiked with the same analyte at the same concentrations as the MS/MSD? Yes or No. If no make note in data review memo.

List the %R of compounds which do not meet the criteria

	LCS ID	COMPOUND	% R	QC LIMIT
Recoveries	s_within_labor	ratory_control_limits		
		-		
	- 1			

- * QC limits are laboratory in-house performance criteria, LL = lower limit, UL = upper limit.
- * If QC limits are not available, use limits of 70 130 %.

Actions:

QUALITY	%R < LL	%R > UL
Positive results	J	J
Nondetects results	R	Accept

All analytes in the associated sample results are qualified for the following criteria.

If 25 % of the LCS recoveries were < LL (or 70 %), qualify all positive results (j) and reject nondetects (R).

If two or more LCS were below 10 %, qualify all positive results as (J) and reject nondetects (R).

2. Frequency Criteria:

Where LCS analyzed at the required frequency and for each matrix? <u>Yes</u> or No. If no, the data may be affected. Use professional judgment to determine the severity of the effect and qualify data accordingly. Discuss any actions below and list the samples affected.

All criteria were metX Criteria were not met and/or see below
 Craundurator

IX. FIELD DUPLICATE PRECISION

Field duplicates samples may be taken and analyzed as an indication of overall precision. These analyses measure both field and lab precision; therefore, the results may have more variability than laboratory duplicates which only laboratory performance. It is also expected that soil duplicate results will have a greater variance than water matrices due to difficulties associated with collecting identical field duplicate samples.

The project QAPP should be reviewed for project-specific information.

Suggested criteria: RPD \pm 30% for Aqueous samples, RPD \pm 50 % for solid samples. If both samples and duplicate are <5 SQL, the RPD criteria is doubled.

COMPOUND	SQL	SAMPLE CONC.	DUPLICATE CONC.	RPD	ACTION
			<u> </u>		
RPD wi	thin labo		 acceptable control limit entrations > 5 SQL	ts for ana	lytes detected at

Actions:

Qualify as estimated positive results (J) and nondetects (UJ) for the compound that exceeded the above criteria. For organics, only the sample and duplicate will be qualified.

If an RPD cannot be calculated because one or both of the sample results is not detected, the following actions apply:

If one sample result is not detected and the other is greater than 5x the SQL qualify (J/UJ).

If one sample value is not detected and the other is greater than 5x the SQL and the SQLs for the sample and duplicate are significantly different, use professional judgment to determine if qualification is appropriate.

If one sample value is not detected and the other is less than 5x, use professional judgment to determine if qualification is appropriate.

If both sample and duplicate results are not detected, no action is needed.

Actions:

All criteria were metX
Criteria were not met
and/or see below

X. INTERNAL STANDARD PERFORMANCE

The assessment of the internal standard (IS) parameter is used to assist the data reviewer in determining the condition of the analytical instrumentation.

List the internal standard area of samples which do not meet the criteria.

- * Area of +100% or -50% of the IS area in the associated calibration standard.
- * Retention time (RT) within 30 seconds of the IS area in the associated calibration standard.

DATE	SAMPLE ID	IS OUT	IS AREA	ACCEPTABLE RANGE	ACTION
Internal sta	ndard within laborato	ry control limits			
				:	

1. IS actions should be applied to the compound quantitated with the out-of-control ISs

QUALITY	IS AREA < -25%	IS AREA = -25 % TO - 50%	IS AREA > + 100%
Positive results	J	J	J
Nondetected results	R	UJ	ACCEPT

2. If a IS retention time varies more than 30 seconds, the chromatographic profile for that sample must be examined to determine if any false positive or negative exists. For shifts of a large magnitude, the reviewer may consider partial or total rejection of the data for the sample fraction.

All criteria were metX
Criteria were not met
and/or see below

XII. SAMPLE QUANTITATION

The sample quantitation evaluation is to verify laboratory quantitation results. In the space below, please show a minimum of one sample calculation:

JC3254-17

Naphthalene

RF = 2.312

[] = (334970)(4)/(411339)(2.312)

= 1.41 ppb OK

All criteria were metX
Criteria were not met
and/or see below

XII. QUANTITATION LIMITS

A. Dilution performed

SAMPLE ID	DILUTION FACTOR	REASON FOR DILUTION		
		·		

R	Percen	t Salide
D.	Lencen	1 (20)11(12)

st samples which	nave ≤ 50 % s	Olias			
	- MANAGE - 11 - 11 - 11 - 11 - 11 - 11 - 11 -			2000	
and the second			-		

Actions:

If the % solids of a soil sample is 10-50%, estimate positive results (J) and nondetects (UJ) If the % solids of a soil sample is < 10%, estimate positive results (J) and reject nondetects (R)